The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Standard Analyses for Oils

IT is an easy matter to talk about the standardisation of analyses, and with many substances such methods of testing present no great practical difficulties. When, however, one considers the decidedly complex subject of oil in all its varieties the problem of agreeing on a model scheme is by no means simple. The multiplicity of methods and apparatus at present in use certainly makes comparison a little indefinite, so that tests upon the same product by different analysts are rarely in agreement. There can be no question that with oil analysis there is every tendency for personal errors to occur, so much so that the individual operator will usually find some discrepancy between his own repeat tests of the same sample, while independent analysts may show widely different results for an identical substance. Such a state of affairs is, to say the least of it, exasperating, and we can quite understand the feelings of Mr. Arnold Philip, who, as an Admiralty chemist, pleaded for some more uniform procedure in his recent paper before the Institution of Petroleum Technologists, an abstract of which we gave last week.

Much as reform is needed, it seems to us that while it might be well to set up a Standardisation Committee in this country for the purpose of examining all methods at present used, the chief stumbling block is the fact that we are certainly not a petroleum-producing country of any very great importance. Consequently, it is scarcely likely that the United States, with her immense output, would feel altogether disposed to accept suggestions from ourselves. Moreover, it must be remembered that while we have studied the problem up to a certain point, some very valuable work has been carried out for the United States Bureau of Mines by Messrs. Rickman, Dean, and Hill. In fact, these investigators have already gone some considerable distance in the matter, and they would, no doubt, expect primary consideration in any attempt to set up a committee for dealing with the matter. At any rate, if an official body is to be set up for the purpose of drawing out a prescribed specification for testing, it will certainly have to be of an international character. For the moment, however, it should be a comparatively easy matter to clear up such obvious anomalies as the expression of temperature in both Fahrenheit and Centigrade in the same report. This apparently is due to the fact that in many, if not in most, existing specifications for refined oils, the temperature limits are fixed for one test in Fahrenheit degrees, and for another on the Centigrade scale.

Mr. Philip is certainly to be congratulated upon the amount of work he has put into his paper, and those having sufficient leisure to study it with care will find a number of points of interest. The author appears to have made considerable headway with his own specially devised apparatus, and so far as this is concerned we have only one comment to offer. This is in connection with the method adopted for recording temperatures in his special fractionation still. It seems to us questionable whether the special thermometer tube thrust obliquely through the side of the still is really going to give the actual distillation temperature, and we should expect to find an appreciable difference in results obtained in this way, and in the more common method of using the thermometer

Chemical Engineering Group

AT a very successful informal meeting of London members of the Chemical Engineering Group on Thursday, October 23, in the rooms of the Chemical Society, Burlington House, Piccadilly, W., details were announced (in addition to those already published in THE CHEMICAL AGE of October 4) respecting the immediate future

programme of the Group. The Chairman of the Group, Professor J. W. Hinchley, who presided, stated that the next conference on "The Transport and Distribution of Liquids in Chemical Works" has been fixed to take place in Newcastle on Monday, December 8, under the joint auspices of the Group and of the Newcastle Section of the Society of Chemical Industry. There will be an afternoon and an evening session, at which papers will be presented on various special types of pumping and elevating appliances applicable to chemical manufacture. In addition a concise and informative summary of general pumping plant for chemical work is being prepared, as well as an exhibition of special pumping devices. Further announcements were also made with regard to the subsequent conferences of the Group.

The Chairman reported the progress already made in connection with the issue of chemical engineering data, and invited the co-operation of members in collecting and collating the immense amount of information suitable for publication under the auspices of the Group. They were strongly of opinion, he said, that collective effort on these lines would be productive of invaluable results, although care must be taken that in the initiation of new work there was no duplication of what had already been done, or was in progress. The rate of publication of such collected data must, in the nature of things, be necessarily slow, although alternatively there should be in hand quite enough to warrant the issue of a "Chemical Engineers' Hand Book." It is understood that the Group has this scheme in mind.

A point which was mentioned in the general discussion subsequent to the Chairman's opening address deserves wider publicity, and that is the possible utility of the Group in acting as a link between users and suppliers of chemical plant. There is often some reluctance on the part of the users of such a machine as a filter press, for example, or a dryer, to say exactly for what purpose the machine is to be employed, and this results very often in the supply of plant quite unsuitable for the end to be achieved. The matter is so well known to any who have had occasion either to buy or to sell chemical plant, that it is not necessary to enlarge upon it. The suggestion made was that the Group could serve as a useful intermediary between the buying and selling parties either in specific cases, or could warrant the definite performance of various sizes and types of plant under definite conditions of working and use. The latter scheme is already in vogue in the U.S.A., the American Institute of Chemical Engineers undertaking, by arrangement with the manufacturers, tests of various kinds of plant, and issuing a certificate of performance of such plant under the conditions governing the investigation. The adoption of either scheme would probably lead to the same desirable ends—closer agreement between the efficiency of any given piece of plant as stated by the makers and as found by the users, and the proper apportioning of plant to the duty required of it.

The accounts of the Group were submitted to the meeting, and the hon. treasurer gave an encouraging statement of the support the Group was receiving from enterprising manufacturers. The experience of the last few years has shown how invaluable is the aid that technical and learned societies can give to industry, and the Chemical Engineering Group in particular is likely to take a foremost place in assisting commercial and productive activity. It can be of use, of course, only in proportion as it receives adequate financial support, and we may confidently recommend investment of this nature to all manufacturers who realise that national prosperity and progress is the surest guarantee of their own success.

Foreign and British Tenders

TENDERS recently submitted to the Electric Lighting Committee of the Edinburgh City Council for the provision of turbo-alternators for a new power station at Portobello disclosed a rather startling disparity between British and foreign quotations. The amount of the tender of the Swiss firm of Brown, Boveri & Co., of Baden, was £106,618, and this, besides being the lowest, was confidently recommended on technical grounds. In the event of foreign tenders being ruled out, it was recommended that the tender of C. A. Parsons & Co., amounting to £174,075—the lowest English tender—be accepted. The City Council decided that they could not pay an English firm practically £70,000 more than a competent Swiss firm was prepared to do the work for, and the contract accordingly goes to Switzerland. There is here surely a matter for the grave consideration of the British workman and the British trade union, for the difference is only to be explained by the relative standards of wages, hours and ratio of output. In connection with this matter Sir Charles Parsons is reported to have said that if he had done the work without any profit at all he could not have come within measurable distance of the Swiss offer, and he proposed to post the details of this case in his works, in order that the British workman might see what was going on.

In the course of the negotiations over the contract, a letter was read from the Board of Trade, suggesting "the desirability of stipulating, as far as practicable, in all contracts placed that the goods to be supplied shall be of United Kingdom manufacture." The decidedly pro-British attitude of the Board of Trade in this matter contrasts rather curiously with its reported attitude respecting imports of German potash. If our information is correct the Board's recent opinion, when the question was under consideration of admitting Alsatian potash on at least equal terms with German potash, was that it would be premature for British firms to commit themselves to taking bulk supplies of Alsatian material or making long contracts. Further, it is rumoured that the Board's advice to certain inquirers was not to enter into contracts for the supply of Alsatian potash salts, accompanied by a reminder that under the Government's contract with Germany supplies of German potash would shortly be available for distribution. Some questions on the subject have already been put in Parliament, but we are not at all sure that they have succeeded in disclosing all the circumstances.

Next Year's British Industry Fairs

THE British Industries Fairs of 1920 will be divided between three cities—London, Birmingham, and Glasgow—and the industries will be distributed among them in groups. Thus, at the Crystal Palace, where the London Fair will be held, the exhibits will include

scientific instruments, optical goods and spectacle ware, and drugs and druggists' sundries. At Birmingham the exhibits will comprise rubber goods for industrial and household purposes, paints, colours, varnishes, and painters' requisites. For the chemical industry Glasgow promises to offer the greatest attraction, for the classes there will include prepared and preserved foodstuffs, light and heavy chemicals, and domestic chemical products. In view of the revival in the chemical industries of America, France, Italy, and other nations, the importance of a strong representation of British chemical enterprise at these Fairs hardly needs to be emphasised. It is not enough to produce the goods the world needs; systematic steps must be taken, by the right use of publicity, to let the world know where they are to be obtained. We heard a high authority on international trade recently express the opinion that the British manufacturer had no superior as regards quality of production, but that he had sadly neglected the science of sale, distribution, and advertisement, as compared especially with German and American competitors. The forthcoming British Fairs will supply an opportunity of making up, to some extent, for our past neglect of these necessary aids to business.

Chemical Publications Held Up

We sympathise with our American contemporary, *Chemical and Metallurgical Engineering*, which has decided, in consequence of the strike movement which is affecting the publishing business in New York City, to suspend publication for the present. It is stated that the more conservative leaders of the International Unions have discountenanced the action of the "pressmen and feeders" and revoked the charters of the striking bodies. The situation is a peculiarly awkward one for *Chemical and Metallurgical Engineering*, as it had been intended to begin issuing the journal weekly on and from October 1. Ultimately this proposal will be carried out, and all the suspended issues printed. It is impossible, however, to say at present when publication will be resumed, and in the meantime a weekly letter is to be issued to subscribers keeping them advised of conditions. The dispute, no doubt, affects many other publications, and accounts for the non-arrival of other United States chemical journals.

Fixed Nitrogen Research Laboratory

A "Fixed Nitrogen Research Laboratory" has been organised in the Nitrate Division of the Ordnance Department, with headquarters at the American University, in buildings formerly occupied by the Chemical Warfare Service. Lieut.-Colonel A. B. Lamb, of the Chemical Warfare Service, is director; Dr. R. C. Tolman, formerly of the Chemical Warfare Service, and Professor W. C. Bray, of the University of California, are associate directors; and Dr. H. A. Curtis, formerly of the Nitrate Division, Ordnance Department, is executive officer. The work carried on during the war on the fixation of nitrogen in the Department of Agriculture laboratories, and elsewhere, will be concentrated at the American University. In the absence of Colonel Lamb in Europe, Dr. Tolman is acting director. At present the staff consists of fifty-five persons.

The Calendar

Nov.		
3	Society of Chemical Industry (London Section). "Shawiningan Chemical Industries," Capt. Sterne. "Black Lead Pencils and their Pigments in Writing," by C. A. Mitchell, M.A.; Exhibit of a Clip for preventing rubber connections from slipping off glass and metal tubing, and for attaching pressure pumps to taps, designed by C. A. Keane, D.Sc., and G. Patchin, A.R.S.N.	Rooms of the Chemical Society, Burlington House, Piccadilly, W.
4	Mineralogical Society. "Villamaninite, a new mineral," by Dr. W. R. Schoeller and A. R. Powell; "On the Occurrence of Phenacite and Scheelite at Wheal Cock, St. Just, Cornwall," by A. Russell; "New Crystal Forms on Pyrites, Calcite and Epidote," by W. J. Spencer; and "A Curious Crystal from the Binnenthal," by Dr. G. F. Herbert Smith.	
4	Manchester Municipal College of Technology. "Paint Grinding," by W. H. Barnes (Follows & Bate, Ltd.).	
4	Sheffield Association of Metallurgists and Metallurgical Chemists. "Welding," by H. Brearley.	Royal Victoria Hotel Assembly Room, Sheffield.
5	Society of Public Analysts. "Egyptian Bricks," by G. Rudd Thompson, F.I.C.; "The Analysis of Brazilian Zirconium Ore," by A. R. Powell and W. R. Schoeller, Ph.D.; "The Halogen Absorption of Turpentine," by Ethel M. Taylor.	Burlington House, Piccadilly, W. 1 (in the Rooms of the Chemical Society).
6	Chemical Society. Ordinary Scientific Meeting. Papers on "Equilibria across a copper ferrocyanide and an amyl alcohol membrane," F. G. Donnan and W. E. Garner; "The peroxides of bismuth," R. R. Le G. Worsley and P. W. Robertson; "The properties of ammonium nitrate": Part 1, "The freezing-point and transition-temperatures," T. M. Lowry and R. G. Early; "Organic derivatives of tellurium": Part 1, "Dimethyl-telluronium-diiodide," R. H. Vernon; "Intramolecular rearrangement of the alkylarylamine: Formation of 4-Amino-*n*-butylbenzene," J. Reilly and W. J. Hickinbottom; "A new modification of 3, 4-dinitro-dimethylaniline," H. Swann; "The refractivities of unsaturated substances," G. Le Bas; "The molecular refractions of benzene and aromatic derivatives," G. Le Bas; "Some 1, 3-benzodiazolearsinic acids and their reduction products," R. R. Baxter and R. G. Fargher.	Burlington House, Piccadilly, W. 1.
7	Society of Chemical Industry. (*a*) The Estimation of P-Phenylene Diamine. By T. Callan, M.Sc., Ph.D., and J. A. R. Henderson, D.Sc. (*b*) The Estimation of Sulphuric Acid in the presence of Organic Sulphonic Acids. By T. Callan, M.Sc., Ph.D., J. A. R. Henderson, D.Sc., and R. Barton, Esq.	Grand Hotel, Manchester.
11	Manchester Municipal College of Technology. "Evaporation," by J. A. Reavall, M.I.M.E. (Kestner Evaporator and Engineering Co., Ltd.).	
11	Sheffield Association of Metallurgists and Metallurgical Chemists. "The Elastic Limit," by F. C. Thompson, D.Met., B.Sc.	Royal Victoria Hotel Assembly Room, Sheffield.

The Synthesis of Ammonia.—(II)

The Technology of the Process

By E. B. Maxted, Ph.D., B.Sc.

Dr. Maxted continues this week his treatment of the problem of the synthesis of ammonia in a second article, which is devoted to the technology of the process. The series will be completed with a third contribution, in which the relation between the direct synthesis of ammonia and the alternative methods of nitrogen fixation will be discussed from an economic standpoint with special reference to their applicability in this country.

The plant employed in the synthesis may be divided into the following sections:—

(*a*) Compressing system;
(*b*) Final purifiers and driers;
(*c*) Synthesising vessels and heat exchangers;
(*d*) Ammonia absorption plant;
(*e*) Circulating pumps;

the relative disposition of these being shown diagrammatically in the accompanying figure.

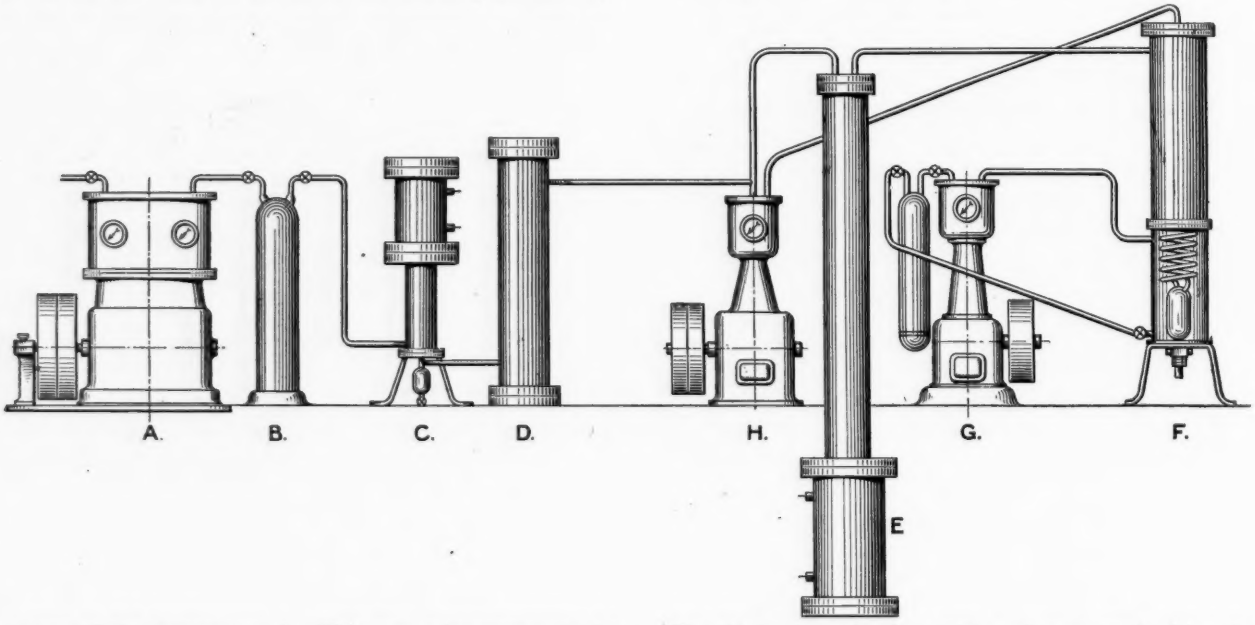
The mixture of nitrogen and hydrogen, which for maximum efficiency should be in the stoichiometric proportions (1 : 3) for ammonia, is raised to the working pressure by means of the compressor *A*. This may advantageously be of the completely immersed type in smaller installations, or of special construction in larger plants, in order to avoid the entrainment of traces of air during compression, the compressing being effected in, for instance, three stages in the usual way, with intermediate water cooling between the stages.

The question of lubrication is an important one in view of the inhibitive effect of traces of lubricating oil on the activity and life of the catalyst. Lubrication by water forms probably the most promising solution of the difficulty yet proposed, especially by reason of the ease with which traces of this, carried by the gas current, are removed in the driers which have to be used in any case. Organic lubricants, on the other hand, even when non-volatile, are not readily and completely eliminated in oil separators, and the penetration of these in mist form—or in whatever condition these traces may be carried by the gas current—into the synthesising vessel, is not desirable even when the lubricant is free from sulphur and other catalyst poisons.

The power required for compression is a considerable item in the whole cost of the ammonia, and, while the exact number of horse-power hours will vary slightly with the efficiency of the compressor, the following table may be taken as a basis for calculations:

TABLE II.

Working Pressure in atmospheres.	Power in H.P. hrs. required for compression per metric ton of combined nitrogen.	Average power per atmosphere compressed.
50	740	14.8
75	810	10.8
100	870	8.7
150	940	6.3
200	1000	5.0



The third column is given with a view to emphasising the economy (within the limits mentioned earlier in the present article) of employing comparatively high working pressures, particularly since the equilibrium percentage of ammonia varies, for small percentages, approximately directly as the pressure, the reaction velocity being also favourably influenced by the same factor.

From the compressing system, the gases pass, usually by way of a high pressure reservoir *B*, to the final purification and drying plant *C* and *D*. *C* consists essentially of a heated pressure furnace, containing active palladium or nickel—or it has also been proposed to use a catalyst similar to that employed in the ammonia synthesising furnace itself—the purifier being heated to the temperature required by the metal taken, and being provided with an exchange system in the usual way. The purifying reactions carried out in this portion of the plant consist in the removal of possible traces of carbon monoxide and oxygen from the gases employed, by reaction of these with the excess of hydrogen present, with formation of water and replacement of the catalytically poisonous traces of carbon monoxide by methane, an impurity which acts to a large extent as a

diluent. In addition, the final purifier may under certain conditions exert an absorbing action with respect to the last traces of other impurities in the gases. The water formed in the final purifier is removed in the drier *D* by means of soda-lime, the dried gas passing from this to the main reaction circuit, in which it forms the source of fresh gas to compensate for that transformed into ammonia.

The operations carried on in this main circuit consist in circulating the compressed hydrogen/nitrogen mixture, by means of the circulating pump *H*, alternately through the synthesising furnace *E*, in which ammonia is formed in quantity determined by the conditions of operation, and through the eliminating system *F*, in which the ammonia formed is removed, the residual gas being returned to the furnace, usually after passing a current drier, not shown in the diagram. The figure illustrates a system in which a refrigerator *G* is used for the removal of ammonia in *F*.

Many difficulties have been encountered in the construction of suitable synthesising furnaces, principally by reason of the rapidity with which steel vessels become brittle and lose their tensile strength when exposed to the action of the nitrogen/hydrogen mixture at the temperature employed for the synthesis. The principal danger in a burst, due to a weakened wall, consists in the sudden liberation of a large volume of hydrogen, with formation of a flame, which by reason of its violence and dimensions is of a particularly dangerous character even in small experimental vessels. For the avoidance of this, the principal danger in the synthesis, various methods of construction and working have been suggested, the most important of these being :

(*a*) The wall of the furnace is kept cool by employing internal heating (electric or other), and separating the heated reaction space from the pressure-resisting wall by means of an adequate thickness of insulating material;

(*b*) As a variation of (*a*), the space between the internally-heated reaction space and the pressure-resisting external wall may be occupied by a heat exchanger of sufficient capacity to bring the temperature of the outgoing gases below 400° C.;

(*c*) Simple externally-heated vessels of special alloy, more highly resistant than ordinary steel to the action of hydrogen at high temperatures, may be employed.

The construction of the synthesising vessels may, further, be very considerably simplified by adopting working conditions such that the heat of formation of the ammonia itself is used to maintain the required temperature, after a preliminary heating-up stage, in which the plant is brought to this temperature before beginning the synthesis. Furnaces are stated to be in operation which consist of a simple bomb, of special alloy, lined and lagged with refractory material, practically the whole of the interior being thus catalyst space. The preliminary heating is effected by injecting air, probably in an extension of the bomb to avoid undue sintering of the catalyst by direct contact with the reducing flame. After attainment of reaction temperature the air supply is shut off, and the heat maintained by means of the reaction energy.

In any case, the necessary conditions for maintaining a heat balance of this nature during the synthesis may easily be calculated from the specific heat of nitrogen, hydrogen, and ammonia, and the heat of formation of ammonia from its elements. Thus for a furnace working at about 600° C., taking the mean molecular heat of the nitrogen/hydrogen mixture between room temperature and 600° C. as 6.82, that of ammonia between the same limits as 10.2, and the heat of formation of ammonia at 600° as 13,000 cals., the following table, showing the percentage of ammonia per passage necessary, with an exchanger possessing, under the working conditions of gas flow, the percentage efficiency given in the first column, for maintaining the reaction temperature without the necessity for extraneous heating, is obtained.

TABLE III.

Percentage efficiency of exchange system, including radiation factor.	Percentage of ammonia (by volume) per passage required for thermal balance.
80	7.8
85	5.8
90	3.8
92	3.1
95	1.9

It will be seen that in order to combine a high space-time yield (*i.e.*, kilos. of ammonia per litre of catalyst space per hour) with this method of working, the efficiency of the exchange system must be high, and the radiation factor reduced to a minimum by adequate insulation.

The gas mixture resulting from the action of the catalyst passes from the cold end of the heat exchanger to the absorption plant, in which the separation of the ammonia from the unchanged nitrogen/hydrogen mixture is effected. Elimination by refrigeration was the earliest method proposed, but possesses the disadvantage, firstly, of requiring a special cooling plant and exchanger; and, in the second place, of only allowing an incomplete removal of the ammonia even by employing temperatures in the neighbourhood of its solidification point. Table IV gives percentage by volume of ammonia theoretically remaining in a gas mixture consisting of nitrogen, hydrogen, and ammonia at a working pressure of 150 and 200 atmospheres respectively, after separation by refrigeration at the temperature stated, but in practice, more especially with the high rates of passage which have to be employed for efficiency, the percentage of ammonia actually observed in the gas after separation is considerably greater than these theoretical figures.

TABLE IV.

Temperature °C.	Percentage of ammonia at 150 atmospheres.	Percentage of ammonia at 200 atmospheres.
0	2.7	2.1
—20	1.2	0.9
—40	0.47	0.35
—60	0.13	0.1

As a result of the inefficiency in practice of the refrigeration method, absorption of the ammonia by means of water under pressure has been introduced, and forms, as the synthesis is at present worked, probably the most used method of elimination. By pumping the water under pressure in countercurrent to the gas flow practically complete elimination of the ammonia is obtained without the use of a refrigerator. On pumping the more or less saturated solution of ammonia into a chamber in which the pressure is released the bulk of the ammonia is evolved as a gas, and there remains a solution of the ordinary strength. The high pressure nitrogen/hydrogen mixture, after passing through the separating water, requires very careful drying by means of a circuit drier containing soda-lime, followed in some cases by sodamide, before becoming once more suitable for passing over the catalyst.

A third method of absorption, involving the use of solid absorbents at comparatively high temperatures, has been proposed, with a view to reducing the temperature range through which the gas mixture has alternately to be heated and cooled for ammonia formation and absorption respectively. The absorbent employed—for instance, anhydrous cobalt chloride—possesses the property, when maintained at a suitable elevated temperature, of absorbing ammonia from the circulating gases, and of giving this up in gas form on isolating the most saturated section of the system—which consists of a series of towers—and subjecting this, without changing the temperature, to the action of a vacuum pump. Elimination of ammonia is not so complete as with water, but, on the other hand, as with the refrigeration method, the difficulty in completely drying the rapidly moving gas current after absorption is avoided. Approximate figures for the

decomposition pressure of the compound formed from cobalt chloride and ammonia in this way are given in Table V.

TABLE V.

Temperature °C.	Equilibrium pressure in m/m.
100	220
110	325
120	430

From the absorbing system, of whatever type is employed, the unchanged gas passes by way of the circulator back to the synthesising furnace, where, with the addition of fresh gas from the circulating plant, the cycle is begun once more. The circulator may be either of the balanced or of the totally enclosed rotary type, and the remarks made above respecting lubrication apply here to an even greater degree. It is, of course, necessary to avoid copper or its alloys in the construction of all parts which come into direct contact with ammonia, this being advisable even in absence of air.

One more feature of the synthesis may be noted before passing on to a consideration of the relation of the direct synthesis of ammonia to other methods of nitrogen fixation, this being the accumulation of the inactive gases of the atmosphere, together with any methane present, in the course of the synthesis. As a result of this the gases contained in the system have periodically to be blown off, in order to avoid an excessive reduction in the partial pressure of the nitrogen and hydrogen undergoing reaction. Assuming the employment of nitrogen manufactured by a high temperature elimination of the oxygen from air—as distinguished from that resulting from a low temperature separation, in which case the full argon content is not present in the nitrogen—it may easily be shown that the volume of gas, which has to be blown away in this manner in order to avoid a more than 10 per cent. reduction in the partial pressure of the nitrogen and hydrogen, amounts to about 3 per cent. by volume of the total gases employed.

Improved Chilling and Transport, Ltd.

A Vegetable Steriliser Process

At the statutory meeting of Improved Chilling and Transport, Ltd., held in London on Thursday week, Mr. I. F. Townsend (chairman) stated that two trial shipments of bacon treated with the company's process had been made from Canada. On the whole the results were regarded as satisfactory. These shipments came over at the hottest time of the year, in the hold of a steamer where the temperature was bound to be unduly high. Notwithstanding these unfavourable conditions, and the fact that, owing to the congestion at the docks, they were kept lying about in the sun for several days, the bacon stood the severe test well, and the firm who sold it reported it as equal to the best bacon on the market. The Public Health Authorities, both here and in Canada, had raised no objection to the use of the steriliser, which, as explained in the prospectus, was entirely a vegetable compound. The board looked for large developments in Canada and America, and the general manager of the American Chilled and the Canadian Chilled Meat Co. was coming over next month to discuss fully an active programme for the coming year, as regards shipments and also for internal use in these countries. The South African rights had been disposed of for a cash payment of £1,000, and practically the same royalties for beef and bacon as were obtained for the American rights. The first plant was being shipped this month.

As regards the abattoir at Cantley, near Norwich, the work had not yet been started. The plans were practically finished and no time would be lost in beginning building. The building at Norwich would constitute an important development in the agricultural policy of this country. The policy of the board was to continue experiments at the premises in Holloway, where they would shortly have a complete installation, enabling them to carry out tests on all kinds of perishable products. These have hitherto been chiefly directed to beef and bacon, but lately the suitability of the process for treating fruit had been under consideration, and although it is too soon to make any definite statement on the matter, it looked as if this might yet prove a most profitable branch of the company's business.

Reviews

Catalysis in Theory and Practice. By E. K. Rideal, M.B.E., M.A., Ph.D., and H. S. Taylor, D.Sc. Macmillan & Co., Ltd., London, 1919. Pp. xv., 496. 17s.

The above volume will be particularly welcomed by reason of the attention paid therein not only to the practical and descriptive sides of catalytic reactions, but also, as far as is possible with the present state of our knowledge, to the theoretical considerations underlying catalysis generally. It cannot be too strongly emphasised that the systematic development of catalytic methods depends to a very large degree on a better understanding of such mechanism, the ultimate aim of this knowledge being, of course, the prediction of suitable catalysts for a desired reaction.

The book deals in a fairly comprehensive manner with the most important applications of catalysis both in organic and in inorganic chemistry, a final chapter being devoted to its use in analysis.

Particular attention is deservedly directed to the modern tendency in industrial gas reactions to employ, as far as possible, the heat of reaction, aided, where required, by the provision of exchangers, and by lagging, for the maintenance of the requisite reaction temperature, in place of extraneous heating. This principle finds particular application in such processes as the catalytic manufacture of hydrogen from water gas and steam, further, in the direct synthesis of ammonia and in the oxidation of this to nitric acid, all of which reactions may be made thermally self-supporting by this method of working, assuming that means are applicable for initially raising the system to the required reaction temperature. There exists also a growing tendency to apply increased pressure not only for the displacement of equilibrium—as in the synthesis of ammonia—but also in gas reactions generally with the object of increasing the reaction velocity and for reducing the size of plant for a given production.

The chapter on catalytic oxidation, in addition to dealing with reactions such as the production of sulphur trioxide, the manufacture of nitric acid from ammonia, the Deacon process for the oxidation of hydrochloric acid and the aeration of Weldon mud, contains a valuable summary of recent work on the elimination of sulphur from gaseous fuels by heat treatment, on the preparation of formaldehyde and on the oxidation by air of organic substances generally. No mention is made, however, of oxidation in presence of osmium tetroxide, a catalytic process which may be carried out in a shaker in much the same way as catalytic hydrogenation but with oxygen in place of hydrogen. This reaction is of special interest from the standpoint of the intermediate compound theory of catalysis and might well be included in a work of the present nature.

The photographs of platinum net before and after being used for the oxidation of ammonia are very striking and may be compared with photographs of metal filaments, which have been exposed to the heating effect of a current only, without any appreciable chemical reaction, when the active and energetic part played by a catalyst will clearly be seen.

The chapter on nitrogen fixation contains an historical summary of published work relating to the synthesis of ammonia prior to the date of the first Badische patents, this being followed by a general account of the synthesis and, in a later section, by a discussion of the catalysts employed for increasing the velocity of reaction at comparatively low temperatures between calcium carbide and nitrogen, alumina carbon and nitrogen, and in the synthesis of cyanides. The remarks made respecting the probable action of promoters are exceedingly interesting, and offer an alternative explanation to the view that these operate either by the conversion of small traces of catalyst poison to a less active form, or by changing the nature of the catalytic surface in ways other than by influencing the selected absorption of the reactants.

The remainder of the book is, with the exception of chapters on catalysis by radiant energy and on the application of catalysis in electrochemistry and in analysis, devoted principally to organic work. Examples are given of catalytic hydration and dehydration including the manufacture of alcohol both from sawdust, by way of glucose, and from calcium carbide by the hydration of acetylene to acetaldehyde and subsequent reduction of this to alcohol. The Grignard reaction in presence of ether, Friedel and Craft's reaction with aluminium chloride, and various intramolecular rearrangements all find appropriate treatment, and a theo-

retical consideration of the mechanism of these and other catalytic reactions in organic chemistry is appended.

In a further chapter, the action of enzymes is discussed, together with anti-enzymes, in the presence of which the activity of a given enzyme is destroyed, probably by some form of chemical association.

It has become the custom to include in chapters on enzyme action, the so-called inorganic ferments of Bredig. Apart from the name, it is difficult to see that any closer relationship exists between the action of these colloidal metals and the true ferments, than between these latter and inorganic catalysts of other descriptions. Points of analogy exist in the action of catalyst poisons and activators (promoters) and, although the connection between another phenomenon mentioned, namely pulsating catalysis, and the biological processes with which it has been compared, may only exist in the form of curve obtained, the periodic undulatory variation in the reaction velocity in such cases is highly interesting and deserves further study.

The final chapter on the application of catalysis to analytical chemistry includes Dennstedt's method of elementary analysis, the Kjeldahl method of estimating nitrogen, and various physico-chemical processes for the indirect measurement of the water content of alcohols, and the concentration of hydrogen and hydroxyl ions.

The book has been well planned and is written in a manner which should result in its speedy recognition as a standard work on the subject treated. A few minor typographical errors, for instance, the transposition of the lettering of the co-ordinates in figure 15 and slight misprints in figure 16 and in the heading of Chapter II, have escaped elimination during the process of proof reading, but these are matters of comparatively small importance and in no way interfere with the general utility of the book.

It may be added that the book will especially commend itself to those readers who desire to have in one volume a general review of the most important applications of catalysis to the various branches of chemistry and, as such, should be assured of a reception which will be gratifying to authors and publishers alike.

E. B. M.

THE CONDENSED CHEMICAL DICTIONARY. First Edition. New York: The Chemical Catalog Co., 1, Madison Avenue. Pp. 528. $5.00.

This lexicon contains a host of information in a close and crisp form concerning chemical products, both of natural and of synthetic origin. It bears the imprint of having been compiled with no little care and skill, and although the size of the volume imposes a natural limit, it will be found to be fairly exhaustive for a manual of this nature. The data include salient properties, physical constants, chemical formula, origin, mode of preparation, type of usual packing, usual grade current in the trade, chief application, risk of fire, and railroad shipping regulations as drawn up by the Interstate Commission and published by the Bureau of Explosives at New York. The synthetic dyestuffs are restricted to the more common representatives, a very wise decision in view of the obvious danger of the volume growing to cumbersome dimensions by the inclusion of a separate group of bodies regarding which excellent books of reference are available elsewhere.

The dictionary is primarily intended for those unversed in chemistry, who in the course of their duties may find it necessary to seek enlightenment on some one or other chemical substance. This means in the ordinary way a hunt for and through highly technical books, with corresponding loss of time, and the publishers have supplied a long-felt want on the part of buyers, brokers, shippers, lawyers, insurance companies, and many other commercial houses requiring from time to time, often at short notice, concise information of the nature supplied in this book. Particularly for such as these the column "Uses" should prove of value, and in future editions these data might with advantage be supplemented. This must not be taken to imply that the new publication will not be found a valuable addition also to the library of the trained chemist, as the field covered is far beyond the limits of the retentive faculty of any ordinary mortal.

The subject matter is suitably cross-indexed, to avoid unnecessary loss of time. A notable omission of a current trade name is that of the term "Nitrolim" for cyanamide, and by a printer's error the formula for chlorosulphonic acid is given as HClCO.

H. J. B.

CHEMICAL CALCULATION TABLES FOR LABORATORY USE. By Horace L. Wells, Professor of Analytical Chemistry and Metallurgy in the Sheffield Scientific School of Yale University. Second Edition, revised. London: Chapman & Hall, Ltd. Pp. 43. 6s. 6d.

A concise tabulation of the more commonly used chemical data. The information is readily accessible, and the addition of the logarithms opposite the list of gravemetric factors and formulæ weights of compounds is excellent. The range of information given, however, is not sufficiently wide to permit it to be used as a laboratory handbook, and it does not add much to the excellent handbooks now available. The thumb-indexed table of logarithms at the back of the book should prove very useful.

E. T. S.

BIBLIOGRAPHY OF SCIENTIFIC LITERATURE RELATING TO HELIUM. Circular of the Bureau of Standards, Washington. No. 81.

This bibliography was first prepared in the early stages of the development of helium for balloon-gas purposes and was intended as an aid to that purpose. It has since been brought up to date, and is believed to include practically everything published up to January 1, 1919, containing anything in the nature of original or historical work. The arrangement of material under each head is such as to bring related articles together in their chronological order, and the bibliography supplies in effect a skeleton history of the subject.

An introductory note, which supplies the reason for preparing this publication, may be worth quoting:—"The development, during the war, of great fractionating plants capable of separating from natural gas a sufficient quantity of helium to supply a fleet of airships has aroused the keen interest, not only of engineers and scientists, but also of the general public in the unique properties of this gas. The year 1918 certainly marks the beginning of a new era in the history and use of helium. Before that time only a few litres of the gas had ever been collected, and the cost per litre was enormous. The separation of millions of litres of the gas at a very moderate cost, therefore, makes the gas at once available for many purposes which formerly seemed impossible of accomplishment. Helium has probably been the most interesting of all the elements to the theoretical scientist on account of the romantic history of its discovery, its occurrence in a remarkable condition of solid solution in many minerals, its formation as a product of the disintegration of the radioactive elements, its liquefaction after a decade of unsuccessful attempts by some of the world's greatest experimenters, the attainment by its use of temperatures below those at which the resistances of pure metals vanish, its many unique physical properties, and the many important theoretical conclusions which have been drawn from its behaviour. All of these points of interest have been the subject of very thorough investigation. The important developments of the future will probably be along the line of the applications of helium, many of which have already been suggested; but in order to make the most of these possible applications it is necessary to know the properties on which they are based. It is as a guide to these properties that, it is hoped, this bibliography will find its chief usefulness."

Books Received

IRON BACTERIA. By David Ellis. D.Sc., with 45 illustrations and 5 plates. Methuen & Co., Ltd., London. Pp. 179. 10s. 6d. net.

THE PROFESSION OF CHEMISTRY. By Richard B. Pilcher. Constable & Co., Ltd., London. Pp. 199. 6s. 6d. net.

BIRMINGHAM COMMERCIAL AND INDUSTRIAL OFFICIAL HANDBOOK. E. J. Burrow & Co., Ltd., London.

A TEXT-BOOK OF QUANTITATIVE CHEMICAL ANALYSIS. By Alex. Charles Cumming, D.Sc., and Sydney Alexander Kay, D.Sc. Gurney & Jackson, London. Pp. 416. 12s. 6d. net.

THE NATIONAL REVENUE of Chile is seriously affected by the marked decrease of nitrate shipments since the Armistice. In his budget for 1919 the Chilian Minister of Finance estimated that nitrate would be exported from Chile to the extent of 52,000,000 quintals, or 2½ million tons, whereas up to the end of June the total shipments amounted to 5,000,000 quintals, or only one-tenth of the estimate

Chemical Aspects of the British Potash Industry

Paper and Discussion at the Birmingham Section

THE Birmingham and Midland Section of the Society of Chemical Industry opened its winter session at the University of Birmingham on Thursday, October 23. There was a representative attendance of industrial chemists and engineers, and in the absence of Mr. L. P. Wilson, of Coventry, the new chairman, the chair was taken by Dr. R. S. Morrell, of Wolverhampton.

It was announced that Mr. Wilson had been elected to the chair, as Dr. E. W. Smith, the chief chemist at the Birmingham Gas Department, was unable, owing to the pressure of engagements, to accept the office. Dr. H. W. Brownsdon (King's Norton Metal Co.) and Dr. Morrell are the vice-chairmen, and Mr. J. C. Sheldon has been appointed representative and corresponding member of the Section on the chemical engineering group. Mr. F. R. O'Shaughnessy, hon. local secretary, said the Section intended to co-operate closely with that group, and on April 22 an important conference arranged by it would be held for the reception of papers, including contributions by American chemical engineers, on labour-saving devices in chemical works.

Production from Blast Furnaces

A paper of exceptional interest was contributed by Mr. E. C. Rossiter (chief chemist, British Cyanide Co., Oldbury) and Mr. Cyril S. Dingley, his colleague, on "Some Chemical Aspects of the Potash Industry in Great Britain." They carried out a great deal of research work during the war period, when it became necessary for this country to search for a possible home supply of the product. The importance of such a supply is, they pointed out, second only to that of the supply of combined nitrogen as regards agriculture and industry. In the case of combined nitrogen the supply can be obtained from synthetic processes, from by-product recovery, and from natural deposits. In the case of potash the last two sources only are possible. Potash occurs as a by-product in considerable quantities in the blast furnaces, the cement and wool-washing industries. There were 240 blast furnaces in England and Wales, and the preliminary examination of each furnace for possible potash production takes about seven days.

After three years' work, the authors stated, we have arrived at a stage when certain conclusions can be drawn as to the probable extent of potash production from this source. It is apparent that unless certain modifications are made in the routine of blast furnace management, namely, the simple addition of salt to the furnace charge combined with an adequate means of cleaning the furnace gases, it is very improbable that sufficient potash can be obtained to make a potash industry worth while. The greater portion of the potash charged into the furnace is carried into the slag; and the collection of the dust from the stoves and boilers will provide only a small portion of the potash requirements of the country, and then only of a very variable and inferior quality.

An examination of materials used in the manufacture of pig-iron has shown, as was to be expected, that the chief source of the potash is the iron ore. Limestones and cokes do not, as a rule, contain much more than 0.1 per cent. of potash stated as KCl or about 3-5 lb. per ton of pig-iron made, but occasionally as much as 13-14 lb. per ton of pig is found in these constituents of the furnace charge.

Blast furnace flue dusts, provided they contain sufficient potash, and have been burnt in stoves or under boilers, can be used without further preparation in agriculture. The potash content varies considerably, and in the heavy dust, such as that obtained from the downcomer, and the flues adjacent to the furnace, it was negligible. The dust from the stoves and boiler settings is usually valuable, and analyses show that the soluble potash varies from 3 per cent. K_2SO_4 with 4 per cent. KCl in the same sample to 30.5 per cent. K_2SO_4; the potash insoluble in water varies from 3-6—11.4 per cent. stated as KCl, and the soluble impurities, namely—sodium and calcium sulphates and chlorides, also vary greatly. The following analysis may be taken as a fair sample of the dust obtained from the stoves of an ordinary blast furnace where no cleaning plant is installed:—K_2SO_4, 10.01 per cent.; KCl, 1.60; NaCl, 1.14; $CaCl_2$, 1.18. Total soluble in water, 13.93 per cent.; SiO_2, 26.40; Fe_2O_3 and Al_2O_3, 37.46; CaO, 9.69; MgO, 1.98; PbO, 0.69; ZnO, 2.30; K_2O, 4.83; Na_2O, 0.55; CO_2, 1.98 per cent. The potash content in the dust from stoves and boilers is exceptionally low.

Distribution of Potash in the Blast Furnace

As to the distribution of the potash in the products of the blast furnace Mr. Rossiter explained that the potash charged into the blast furnace comes out either in the slag or in the gas. In the slag it probably occurs combined with silicates, and in the gas as a very fine fume, which, after cooling, may contain the potassium as carbonate, bicarbonate, formate, cyanide, thiocyanate, sulphate, and chloride, with small quantities of bromides and iodides. It usually contains a constant quantity of chloride with varying quantities of carbonate and a smaller quantity of cyanides. It varies considerably for each works. This fume is so fine that a sample of the gas, if drawn into a hot aspirator, shows no signs of settling after remaining for several hours. In works which do not clean their gas most of the potash carried in the gas eventually escapes up the chimney after the gas is burnt at the boilers and stoves, and is evident in the white fume issuing. A small proportion is deposited with the heavy dust collected in the dust catcher and the first portion of the gas main, and a larger proportion (but less than 10 per cent.) is deposited in the stoves and boiler flues, where, after the gas has been burnt, it is present as a mixture of sulphate and chloride. The quantities obtained in these various positions have not been carefully estimated. The few figures collected indicate about two tons of heavy dust and 12 cwt. of boiler and stove dust per 100 tons of iron. For the manufacture of potassium salts only that portion of the potash which is carried by the gas is available, unless the small quantities of stove dust are collected for this purpose, and therefore when considering the distribution of potash it is of the first importance to determine the quantities of potash present in the gas and in the slag at every blast furnace.

It is apparent that the greater the quantity of potash present in the ores the greater is the proportion remaining in the slag, and that unless a large proportion of the potash remaining in the slag can be transferred to the gas, a sufficient quantity of potash to make a potash industry worth while will not be available. Experiments show that by the simple addition of salt to the furnace charge a larger proportion of the potash is transferred from the slag to the gas—a process which has previously been described by Mr. Kenneth M. Chance.

As to the ferro-manganese furnaces, the whole of the potash is volatilised into the gas under normal working conditions, and a large proportion is obtained as carbonate. When the potash obtained in the furnace products is estimated and compared with the potash charged into the furnace some undetermined factors come in. Without a supply of labour and supervision much greater than has, up to the present, been available, it is impossible accurately to weigh and sample the ores, coke, and limestone charged into the furnace. We know that the potash content of the ore varies considerably in each district, so that reliable figures will be obtained only by taking the average over long periods.

The quantity of slag produced by a furnace is not weighed, and the weight taken for these calculations is that estimated by the furnace managers. The gas produced cannot be accurately measured in its dirty condition, and is calculated from the average quantity of coke used, one ton of coke being assumed to give 150,000 cubic feet. It is, therefore, surprising that the quantity of available potash, as calculated from the ores used, does not differ from the quantity calculated from the furnace products in a greater degree. In fact, the two calculations are sufficiently near for all practical purposes. This agreement is not shown in the case of furnaces making ferro-manganese, where the potash calculated from the gas is considerably more, and in one case double that calculated from the furnace charge. This requires further investigation, and at present we can only suggest that at these furnaces potash is being deposited in the stoves whilst they are heating up, and being blown from there into the furnace by the hot blast and so going round and round. This may be happening also at other furnaces, although the figures do not show it except in one case.

Increased Volatilisation due to Salt

The authors point out that there is increased volatilisation of potash due to the addition of salt to the blast furnace charge, and they gave details of experiments, with and without salt, in hematite furnace, basic iron furnace and Cleveland iron furnace. The first-named, using only foreign ores, containing a small percentage of potash, has, on the average, given an increase of 9 lb. KCl for 13 lb. of salt, and during the last four periods, when the salt was more advantageously adjusted, an increase of 8.1 lb. KCl for 9.2 lb. of salt. When the salt is properly adjusted there is every prospect that 1 lb. of KCl will be obtained for every pound of salt used. The basic iron furnace using 55-70 per cent. Cleveland ore mixed with foreign ores has, on the average, given an increase of 14.6 lb. KCl per 37 lb. of salt, or 1 lb. KCl for each 2½ lb. of salt used. The Cleveland iron furnace using 94 per cent. Cleveland ore has, on the average, given an increase of 18.5 lb. KCl per 37 lb. of salt, or 1 lb. KCl for each 2 lb. of salt used. In both these furnaces the result is very similar. A substantial increase in the potash volatilised into the gas is obtained, but the potash in the slag cannot on the average be reduced to less than 1.0 per cent. KCl; that is, the greater portion of the potash remains in the slag. A larger quantity of salt will reduce the potash in the slag, although up to the present we have never obtained a satisfactory reduction; but with this larger quantity of salt the proportion of sodium chloride volatilised into the gas is so high that the separation of the sodium and potassium salts at the potash works is rendered more costly.

Mr. Rossiter believes this retardation of the action of salt in furnaces using Cleveland ores to be due to the low ratio of lime and magnesia to silica in the slags from these furnaces. Before salt is added the fume carried by the gas is neutral, and contains chlorides of calcium, iron, and aluminium, so that there is already present more than

sufficient hydrochloric acid to combine with the potassium which is volatilised, but the low working temperature of the furnace may also retard the volatilisation of the potash. At furnaces, provided with an adequate gas-cleaning plant, the potash is removed without incurring any extra cost, except that for the salt added.

Analytical Methods

Discussing the analytical methods, the authors observe that at the beginning of the investigation the difficulty of obtaining an average sample of the gas issuing from a blast furnace presented a grave problem. Small glass apparatus were useless. The large quantity of dust and steam carried by the gas necessitates special apparatus, and, owing to considerable variations taking place from hour to hour, it is necessary to take a continuous sample over several hours. A reliable test can be obtained by passing from 20-100 cubic feet of the gas through the apparatus, allowing this quantity to pass in from eight to twenty-four hours. The larger the quantity and the longer the duration of the test the more reliable is the result. In order that a representative sample may be obtained it is necessary to choose a straight portion of the gas main, so that the gas is fairly free from eddies, and to take the sample from a point about one-third of the diameter of the main from the circumference. This point must not be too near to the furnace, because then the apparatus may quickly become choked with the heavy dust; nor must it be so far away that any appreciable quantity of the light dust has settled. A position about 20-30 yards from the furnace is usually a good point to choose. The apparatus consists of a thin-walled iron tube, $\frac{3}{4}$ in. diameter, about 3 feet long, closed at one end, and with a $\frac{3}{4}$ inch hole in the side near the closed end. This tube is placed in the gas main so that the $\frac{3}{4}$ inch hole is facing in the same direction as the gas current. The gas is drawn by suction.

Northamptonshire ironstone has the highest average potash content. Mr. Rossiter states that from the results obtained by the addition of salt they concluded that in the case of furnaces using North Lincolnshire ores about 80 per cent. of the potash will be volatilised into the gas, and be therefore recoverable by the use of adequate gas-cleaning plant; the hæmatite furnaces will also yield about 80 per cent. of the potash, and the furnaces using Cleveland ores about 33 per cent. of the potash contained in the furnace charge. Assuming that the Northamptonshire and N.W. coast ores will yield 80 per cent. of the potash, the remaining home ores 33 per cent. of the potash and the coke used 50 per cent. of the potash contained in these materials, the potential production of potash from this source could be estimated. A potash industry obtaining raw material from the blast furnaces of England and Wales will therefore be able to provide potassium salt equivalent to some 63,000 tons of potassium chloride per annum. If other factors were considered—the potash now going to waste in the manufacture of ferro-manganese, the substitution of home ores for foreign ores, and a margin for improvement in the recovery of potash from furnaces using Cleveland ores—it appeared that 80,000 tons of potash per annum, as KCl, equivalent to 50,000 tons of potash expressed as K_2O, can be recovered—or double the pre-war consumption of this country.

Discussion

Testimony was paid by various speakers to the excellence of the paper, to the enormous amount of work and detail it represented. Dr. Maxted, of Walsall, described the contribution as a classic.

The thanks of the section were conveyed to the authors, on the proposition of Dr. Morrell, who expressed the view that the results would be of great value to the community at large. He enquired if the durability of the linings of the furnace were affected by the addition of salt, and Mr. Dingley replied that so far as they had been able to discover no injury of this kind was occasioned.

Dr. Slater Price (Birmingham Technical School) raised the question whether the potash recovered would be able successfully to compete with the products from abroad.

Mr. Rossiter said when the apparatus was provided there was no further expense beyond that for salt added, while the importance of the cleansing of the gas could hardly be exaggerated.

Mr. H. Silvester said that furnace owners would welcome information as to a cheap gas cleaning apparatus. Furnace gas must be clean if it was to be used in gas engines.

Mr. King thought the action of chlorides on the silicate could be viewed rather as a breaking-up of the silicate and combination with the free chlorine at the furnace temperature.

Mr. F. C. A. H. Lantsberry (chief chemist, Birmingham B.S.A.) expressed the hope that with the development of the pig iron industry more furnace gas would be used in gas engines.

Dr. Brownsdon (King's Norton Metal Co.) was of opinion that the time would come when the potash must be recovered in this way.

Mr. Rossiter, in reply, said a substantial amount of potash was made every week at Oldbury from the blast furnaces. The question was whether the enormous waste of power and fuel now going on would be allowed to be continued.

Site, Lay-out, and Construction of Chemical Works

Gravitation and Level-Flow Systems

Mr. John Allan (Messrs. Joseph & Son, Ltd.) gave his second and concluding lecture on "Site, Lay-out and Construction of Chemical Works" on Tuesday at the Manchester Municipal College of Technology.

Dealing with building construction, Mr. Allan said that it was imperative to make certain that the foundations provided by the site selected for the works were sufficient for the building it was proposed to erect. The whole question was of the utmost importance because the system adopted in the factory, so far as the flow of materials was concerned, might be entirely altered by the nature of the foundations. If of a certain character the works might be operated in such a way that the materials passing through them were kept very nearly on a horizontal plane; in other cases it was possible to make use of gravitation to carry the materials used through the works.

The Gravitation Flow

If the materials were mainly liquids or solutions, the gravitation flow would be peculiarly suitable. In the case of sugar refineries they had a substance which could be readily brought into solution and which had all the treatment given to it applied while in solution until the final stages of the process were reached. Lard which was suited to the gravitation flow was in such a case peculiarly suitable. It was common to find in sugar refineries that the solid sugar as it arrived was transported to the top of a six, seven, or eight-storey building and thereafter fell in fluid form through the different vessels to the last stage, where it was crystallised. There was also facility afforded for carrying out on this system work in which large quantities of materials were involved and yet the ground covered was a comparatively small area. He excluded, of course, in this reference warehouses and such attachments to the works and was speaking of operative plant worked on the gravitation system.

The Level-Flow System

If, however, the materials which were being operated were heavy, if many operations were involved, and frequent additions were made to the material passing through the works, it would often be found that the level-flow system was more particularly suitable. Mr. Allan gave as an illustration though not, as he remarked, a strictly chemical example, the method of dealing with the material in the form of wheat to produce the largely advertised "Grape Nuts." Such a system easily provided for the introduction of new materials. Another case where the horizontal flow system was particularly suitable was where the product in the course of passing through the works was transformed into a large number of small packages, or where the main, initial, starting block of material was broken up into a variety of materials as it passed through the works.

There were many examples of horizontal systems in operation in chemical works where the gravitation system might be employed if it were not for the fact that here and there in the apparatus which had to be employed in carrying out the process it was necessary to have very bulky units in the plant. Where units or portions of the plant were large, it might be imperative to adopt the level-flow system. A useful thing to bear in mind in considering the lay-out of plant was that it was possible to take advantage of irregularities of land, which might be a hindrance or a help. Sloping land might be useful in an application of the gravitation system. Another point to consider in the lay-out of plants in which soluble materials were used was the advantage offered by the gravitation system in pumping the material to the top of the works and allowing it to fall by gravity to the foot of the plant. In arranging for the general lay-out, so far as transport was concerned, it was desirable, first of all, to determine the amount and nature of the residue which the processes were going to create—whether bulky, heavy, solid or liquid. Whatever its nature might be, special provision should be made to prevent any possibility of interference with the feed of the raw material into the plant by waste, by partially-operated material, or by rejected material, or the balance of the whole might be disturbed.

The Supply of Raw Material

One of the most important things to be determined in the lay-out was the constant supply of raw material. There should also be provision made for cheap handling and raising to such levels as would allow for gravitation flow through the preparing plant. This point was often lost sight of, and the preparing houses were not infrequently neglected. Mr. Allan illustrated with blackboard diagrams, how the

plant might be advantageously arranged where only one material was being used, and also where more complicated operations were carried out.

Position of Water Mains

With regard to water and other mains, he pointed out the great advantage of having them where they could be easily accessible, and advocated the carriage of them on bridges and alongside buildings on brackets or columns, thus avoiding interference with roadways, as was the case with underground mains. Leakage of material could also by this means be easily observed at once. In too many cases where sources of supply were underground, it was a case of "out of sight, out of mind." Many times tanks which were likely to leak were buried in clay. Extensive leakages might take place through the carrying of tanks, pipes and other vessels underground, so that the lay-out to provide for was greatly improved if it were arranged to put them where they could be seen. Treating of the steam supply, the lecturer said that while in small works it was advantageous to have it centralised, in large works there was very often great justification for splitting up the supply. Concluding with a brief reference to super-heating, and to the provision of vacuum for vacuum filters and the like, in different parts of the works, Mr. Allan said he had attempted to describe principles rather than details of practice, and he had chosen the simple plant he had illustrated, so as to direct attention to the main points which he thought ought not to be forgotten in arranging the general system of buildings.

British Home-made Dye Supplies

The feeling of irritation in dyeing circles, more apparent in Yorkshire than in Lancashire, will not be allayed until the pre-war palette of colour is at the service of the textile colouring industry. The home production of this full range will be impossible for years to come, but undoubtedly work is now proceeding more smoothly and rapidly in the large dye-making centres. It has been pointed out that in subsidising the industry the Government should have insisted on more co-ordination, especially in the production of intermediates. Some of these are used in very small bulk, but at the same time are absolutely necessary. The argument is that it is a waste of effort to allow, say, half-a-dozen firms to engage in the manufacture of an intricate product which could be supplied to the whole trade by one moderately-sized plant. Anthraquinone is instanced. It is said to be made by about five firms, all probably receiving Government grants. This is a highly important intermediate, but if it had been left to the attention of, say, two firms, the others could very profitably have turned their energies to intermediates still missing from the list. Work is now proceeding on the new works of Scottish Dyes (Limited), at Grangemouth, on the Firth of Forth, and when these large factories are in full working order the available supply of British-made fast dyes will be largely increased It is the intention of the company to concentrate on the vat dyes to begin with.—*Times Trade Supplement.*

Dye Intermediates

To the Editor of The Chemical Age.

Sir,—Like your correspondents, Messrs. the Synthetic Chemicals, Ltd., we have been subscribers to your useful Journal from the commencement, and have also been much impressed by its character.

We presume the intermediates mentioned in their letter (Chemical Age, October 11) are intended for sale principally to dye manufacturers, and we think it would perhaps be of interest if we, as dye manufacturers, pointed out that we are obliged to manufacture the intermediates named in your correspondents' letter ourselves, as we certainly could not purchase them at the figures quoted and use them for the manufacture of dyestuffs required to be sold by us at a profit.—We are, etc.,

The London Dye Manufacturing Co., Ltd.,
(P. A. Lothbury, *Managing Director.*)
City Mills, 86-94, High Street, Stratford, E.
October 24, 1919.

The Food Controller has issued an order withdrawing linseed and linseed oil from the schedule of the Seeds, Oils, and Fats Order of June 19, 1919. The effect of this Order is that licences issued under the authority of the Food Controller will no longer be required to purchase or sell either linseed or linseed oil.

Staffordshire Iron and Steel Institute

The Fuel Question

At a meeting of the Staffordshire Iron and Steel Institute, at Dudley, on Saturday, October 25, Mr. W. Macfarlane spoke on the fuel question.

As the repletion of a coalfield was impracticable, certainly, within time limits, he said, steps should be taken to economise and to find substitutes for coal. Since 1900 and until nearly the time of the outbreak of war, the output of anthracite and bituminous coal in the United States had increased at a compound interest rate of 6 per cent., Germany 4 per cent., and Great Britain 2 per cent. The percentages of reserves of the coal supplies were as follows:—United States, 51.8; Canada, 16.4; China, 13.5; Germany, 5.7; Great Britain, 2.6; Siberia, 2.3; Australia, 2.2; and other countries, 5.5. It was plain from these figures, that unless some new forces could be harnessed the dominant position must by and by pass to the Western Continent and then to China. If, however, the genius of the people could build up the present economical and efficient postal system, it was surely equal to the task of organising the means of dealing with fuel from its place in the depths of the earth till its constituents were dissipated in the air. Ought there to be State regulation of the utilisation of fuel?

The same idea had been promulgated of concentrating coke ovens, blast furnaces, and steel works closely adjoining each other. On high authority the opinion was expressed that given 35 cwt. of coal for each ton of pig-iron to be produced, coking that coal with a coke oven of modern design, using the coke produced for iron smelting, and utilising to the full the gases evolved from the coke ovens and the blast furnaces, no further fuel would be needed to perform all the work required for smelting, for conversion into steel, reheating and rolling into the finished material. It was a conception worthy of careful consideration, and was put forward as a practical ideal. During the war period over 1,750 by-product coke ovens were laid down at a cost of nearly £5,000,000, to which the Ministry contributed £1,250,000. It was anticipated that the total output of coke from these ovens would be about 16½ million tons per annum when the plants were in full operation, approximately, a 50 per cent. increase upon the pre-war output. This increase in the production of coke would require 8¼ million tons additional coal per annum, representing the labour of 33,000 coal miners.

Recovery of By-Products

As far as practicable, all bituminous coals should be subjected to a coking, or semi-coking, process at a comparatively low temperature, so that by-products should not be wasted. If only half of the coal used in Great Britain for manufacturing and domestic purposes were semi-coked there would be a yield of two hundred million gallons of motor spirit, which was double our pre-war consumption; two million tons of pitch, half a million tons of ammonium sulphate, and 40 million tons of semi-coke. There was at present a great outcry for more houses, and, probably, many would be built at some not very far distant date. Advantage should be taken of this opportunity, and chimneys should be designed and built with the view of burning more coke, or semi-coke, in our domestic fires. If the major portion of the 36 million tons of coal consumed in our homes were previously treated for residuals, even if only partially, there would be a national enrichment, and the air of our cities would be more pure, and sunlight more abundant and active. Alcohol might, for some purposes, be substituted for coal, and would help us a little way towards conserving our reserves. As a substitute for petrol, alcohol had a rival in coal-tar benzene, a hydro-carbon which was certain to be turned out in the future in far larger quantities than was formerly the case. More economic burning of coal would lead to the recovery of more coal-tar products, of which benzene was one of the most important and plentiful. Many experiments had been made on mixtures of alcohol and benzene as a fuel for motors. A mixture of alcohol with 10 per cent. of benzene furnished a cheap motor fuel, costing not more than 6d. per gallon, and utilisable in existing petrol motors with little or no alteration in the carburettor.

The Board of Trade announce that all edible oils have been removed from List A of prohibited exports, except cocoanut oil, ground nut oil, and palm kernel oil. The exportation of the last remains prohibited to all destinations, except under licence.

Chemical Research and Application

By Dr. William H. Nichols

(*President of the American Chemical Society*)

RESEARCH in the distant past was the privilege of the few. In chemistry, during the Middle Ages, the alchemists were practically the only ones pursuing it, and they in secret, and not always from the highest of motives. Working by themselves, as they did, they had not the great advantage of meeting and discussing with others similarly engaged, and using their progress and mistakes to intensify their own increase in knowledge. Thus it has come about that the science of chemistry is little more than a century old, and its tremendous advances only a few decades. The first chemical society in the world was born in Philadelphia in 1793, and yet the real advances have been made since the formation of this Society in 1876. Since that time, however, the advance in knowledge has been startling, not alone in this country, but in all civilised countries. It is not boasting to say, however, that during all that time the progress in this country has been in nowise behind that of the best anywhere, which our public is at last beginning to recognise. Particularly during the trying period of the war, when vast and new problems were suddenly thrust upon them, the work of our chemists has been beyond praise.

At the foundation of all this advance research is firmly embedded. No one can deny that there have been accidental discoveries, some of great moment; but accidental discoveries are not to be relied on, although they are not to be scorned. In chemistry the accidental good fortunes have usually come to those who were really seeking, although possibly for something far different, but they were usually made by men qualified to recognise an important discovery when it flashed across their vision.

Research and Invention

Research, of course, is not of necessity to result in invention. It may in that respect terminate in a *cul-de-sac*, from which, with present knowledge, there is no egress, or, what more frequently happens, it may lead to a line of reasoning, which in time leads to another, and so on, until suddenly a bright light illumines the way, and a goal of the greatest possible importance is attained. True research must be intentional and intensive. We must have imagination, it is true, but we must have more than that. There must be the foundation of sound education, and the ability to extend it to embrace new and unexpected knowledge, and apply this in turn as we progress upward.

To fit a man for research in chemistry or any other science many things must be accomplished before the candidate is ready to take his first advanced step. Many methods of procedure have been suggested, and some heat of argument generated; but all agree that education which produces real practical knowledge is absolutely essential. All agree, also, that the person to be prepared must be a likely subject; and that energy and time should not be wasted on those who do not show that they possess certain necessary qualifications. I think that it will also be generally admitted that the teacher himself should not only have great attainments, but must also possess the rare quality of being able to transmit knowledge in such a way that it will be truly absorbed by the pupil and form part of him. One of the greatest mathematicians I have ever known was about the poorest teacher. He knew, but could not impart. The future of the world, therefore, depends in a very large degree on the teacher in the school and on the professor in the college. They have an opportunity to mould the world, which many of them thoroughly appreciate.

Alas! in most instances the consciousness of work well done is about their only reward. Some day, and I hope not a very distant one, it will be generally recognised that, like other labourers, they are worthy of their hire, and their compensation will more nearly approximate the value of the work done. When that happy day arrives they may experience a little less of the satisfaction of sacrifice, but they will have other comforts and hopes which will more than make this up to them and to their families. The people of this country can make no better investment than one liberal enough to cause the teaching profession to attract not only those whose high sense of duty leads them to embrace it at a sacrifice, but also those who cannot afford to make the sacrifice, however anxious they may be to do so. Men preparing for research must have the best men in the country to guide them, and it is not fair to expect these men, as so many have done in the past, to live the narrowing life of poverty. Neither is it wise.

There are a few foundations specifically provided for chemical research, such as the Warren Fund of the American Academy of Arts and Sciences, the C. M. Warren Fund of Harvard University, and the Wolcott-Gibbs Fund of the National Academy of Sciences. There are a number of foundations for promoting research generally which have included chemical research within their fields, such as the Bache Fund of the National Academy of Sciences and the Elizabeth Thompson Science Fund. The Rockefeller Institute for Chemical Research fosters chemical research contributory to its main object; the Carnegie Institution of Washington supports chemical research in its general policy of advancing knowledge through research. The newest of all is the fund recently placed at the disposal of the National Research Council for stimulating chemical research. There is need for many more foundations if we are to keep pace with the rapid strides of civilisation, or, better still, to determine the direction they will take.

American Labour and National Welfare

The importance of research is being more and more recognised and understood by the public. One of the most encouraging evidences of this is shown in the preamble and resolution adopted recently by the American Federation of Labour at Atlantic City, indicating, as these do, a clear appreciation by that great association of how much we all depend on what science will disclose to ameliorate the conditions of the future. It is well worth while to read these in full here. They are as follows:—

Whereas scientific research and the technical application of results of research form a fundamental basis upon which the development of our industries, manufacturing, agriculture, mining, and others must rest; and

Whereas the productivity of industry is greatly increased by the technical application of the results of scientific research in physics, chemistry, biology and geology, in engineering and agriculture, and in the related sciences; and the health and well-being not only of the workers but of the whole population as well, are dependent upon advances in medicine and sanitation; so that the value of scientific advancement to the welfare of the nation is many times greater than the cost of the necessary research; and

Whereas the increased productivity of industry resulting from scientific research is a most potent factor in the ever-increasing struggle of the workers to raise their standards of living, and the importance of this factor must steadily increase, since there is a limit beyond which the average standard of living of the whole population cannot progress by the usual methods of re-adjustment, which limit can only be raised by research and the utilisation of the results of research in industry; and

Whereas there are numerous important and pressing problems of administration and regulation now faced by Federal, State and local governments, the wise solution of which depends upon scientific and technical research; and

Whereas the war has brought home to all the nations engaged in it the overwhelming importance of science and technology to national welfare, whether in war or in peace, and not only is private initiative attempting to organize far-reaching research in these fields on a national scale, but in several countries governmental participation and support of such undertaking are already active, therefore be it

Resolved, by the American Federation of Labour in convention assembled, that a broad programme of scientific and technical research is of major importance to the national welfare and should be fostered in every way by the Federal Government, and that the activities of the Government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended; and the secretary of the Federation is instructed to transmit copies of this resolution to the President of the United States, to the President *pro tempore* of the Senate, and to the Speaker of the House of Representatives.

I hope and believe that this matter, coming as it does from a new direction, will be most seriously considered by the proper authorities—not that it has not already been well understood in Washington, but that renewed interest may be taken and even more liberal appropriations granted. The Federation resolution urges that "a broad programme of scientific and technical research is of major importance to the national welfare." Good! Now that everybody is agreed, how was it possible that for so long a time this belief was held by so few, and these composed almost entirely of men of science? The question, therefore, is squarely before the country, and the urgency of it thoroughly appreciated by those who have the most to gain by it, namely, the workers, on whose efficiency so much depends. This opens the way to a scientific solution of vital questions about which there has been such fundamental differences of opinion, based largely on what may be called the point of view.

Capital and Labour

People have divided themselves into classes—a very dangerous course—and many have actually believed that there must of necessity be a deeply rooted difference between capital and labour, and that the true interests of either were entirely apart from those of the other. Many have held that labour is a commodity which it was to their best interest to get the most of for the least money, while many others believed that labour was the sole source of all wealth, and that the fewer hours worked, and the smaller the output of those hours, the better it would be, somehow or another, for the labouring classes. I have cited the extreme views for purpose of illustration, realising that somewhere between the two would be found the great body of all reasonable and thoughtful men. We may leave out of consideration here that ultra-extreme class who teach, whether they believe it or not, that the true interests of labour would be best served by sabotage and syndicalism, and all the other fantastic notions which have of late years been more or less in evidence, and liable to catch the unwary. To these, research presents no attractions.

I am going to venture to suggest to the working man who is earnestly desirous of bettering his own and his family's condition that there are a good many sciences besides chemistry and the engineering and abstract sciences in general. Some of these he is better able to study and practise than anyone else. Many of the fundamental truths concerning labour and its conditions would never be discovered by the scientist *per se*, because he has not had the benefit of practical preparation. Let our friends of the American Federation of Labour not be content with what the Government can do in the line of their resolution, good as it has been and will be, but let them start a carefully planned series of researches themselves, and follow them up until the truth stands revealed. They can depend upon the assistance of this great Society. The employers of labour have been doing this for years, singly and in groups, seeking the same end. The shining goal of all research is the truth, the whole truth, and nothing but the truth. Thus, starting from different angles, with fairness and thoroughness, the various so-called interests will arrive at the same truth, for there can be only one truth concerning any question. Thus will it come to pass that capital and labour will discover that the true interest of one is the true interest of all, and instead of bickerings and suspicions we will have that cordial co-operation which is absolutely essential if we would get the best out of this good old world.

Photography of Coloured Objects

Address by Sir William Pope

THE formal opening of the Chemical Section of the Manchester Literary and Philosophical Society has been marked by an address on "The Photography of Coloured Objects," by Sir William Pope, F.R.S., Professor of Chemistry in the University of Cambridge. He mentioned that the modern processes of photographic colour-printing and the present-day panchromatic photographic methods for obtaining a correct rendering in monochrome of parti-coloured objects were based upon the success attained in imparting sensitiveness throughout the visual spectrum to the ordinary blue-sensitive photographic plate. By staining the plate with erythrosine it became sensitive to green and orange; plates so treated were termed orthochromatic. A number of dyestuffs belonging to the class of cyanine dyes discovered by Greville Williams in 1856 were capable, however, of sensitising a photographic plate throughout the whole range of the visible spectrum. These substances were difficult to make and but little concerning their preparation and chemical behaviour had been published. Their photographic applications were carefully studied by several of the large German coal-tar colour firms and those most suitable for use in colour photography were selected and put on the market under trade names which disguised their chemical identity. At the outbreak of war the Allies were entirely dependent on Germany for these so-called photographic sensitisers. The experimental investigation of sensitising dyestuffs was instituted in the chemical laboratories of the University of Cambridge by Dr. W. H. Mills and himself at the end of 1914. Methods for producing the ordinary sensitising dye-stuffs on a technical scale were devised and all the sensitisers used by the Allies had been prepared in the Cambridge laboratories since the German importation ceased.

The Conservation of Fuel

Industrial Chemists in Gasworks

THE new President of the Midland Junior Gas Association, which opened the winter session on Saturday, October 25, at the Council House, Birmingham, is Mr. C. Carrington Barber, works engineer at the Saltley Gasworks, Birmingham. He is a son of the late Mr. Hampton Barber, a former secretary of the department. Mr. Barber succeeds Mr. T. H. Poulson, of Stafford. The hon. treasurer is Mr. T. F. E. Rhead, M.Sc., of the Central Laboratory, Nechells Gasworks, and the hon. secretary is Mr. W. H. Dean.

In his presidential address Mr. Barber made a strong point for conservation in the use of fuel. Coke dust, for a long time a drug on the market, should be burned on the boilers; on works upon which he was engaged two Babcock & Wilcox boilers had been installed, fitted with chain grates. The quality of gas coal had to be considered in respect of the ash content, not only because of its effect on the yield of gas per ton of coal carbonised, and the yield of tar and ammonia, but because of its effect on the quality of the coke produced. His belief was that in the future the generation of electricity and the production of gas would be a joint industry. If we were to obtain the most out of our coal resources, then coal should be carbonised and the gas converted into electrical power, and the by-products, which to-day were lost at the power stations, would be recovered. What was the best method of gasifying coal? It did not necessarily mean that the system of carbonisation which gave the maximum yield of gas per ton of coal was the best, but the question of the cost of manipulation, the yield of by-products, and the quality of the coke had to be considered, in addition to the first cost and the probable cost of upkeep. Too much had been made of the high makes of gas per ton of coal carbonised. They had been striving to get the highest yield of gas possible, but at times it had been to the detriment of the composition.

Necessity of Employing Industrial Chemists

The process of gas manufacture was a chemical process, and as such the gas engineer should also have a sound chemical and physical knowledge. Where the gasworks were sufficiently large an industrial chemist should always be employed. Every works making over one hundred million feet of gas per annum came under that heading. When visiting different gasworks it had been astonishing to him to find in many cases that the engineer had been unable to tell the quantity of ammonia passing the ammonia washers, or the amount of tar entering the purifiers.

Those were details, but it was to a very great extent details that mattered, and much money could be saved if those and other matters, which were often considered trivial, were given closer attention. The whole of the apparatus in gasworks dealing with the extraction of tar, ammonia, sulphur, &c., should be in charge of the industrial chemist. There had been an enormous increase in the application of gas for industrial purposes, and, by diligent work and research, this market should be fostered to the fullest extent.

Chemistry and Agriculture

Lecture by Professor Morgan

PROFESSOR MORGAN, in the course of a lecture on "Chemistry and Agriculture," at Birmingham University last week, emphasised the importance of intelligent chemical treatment of soil and its bearing upon the cost of food. The greater part of plant food (he said) came not from the soil, but from the atmosphere, which furnished, amongst other things, moisture and carbon dioxide. In addition, a plant required five other elements, the first and most important being nitrogen. The soil was a storehouse of living organisms, some of them microscopic in size, and others larger, like earth-worms, which took an important part in fertilisation. Bacteria played a controlling part in the fertilisation of soil. Some of them assisted, but others did harm by helping in the leakage of nitrogen—which was essential to growing things—from the soil. The constant leakage of nitrogen from the soil was an extremely important matter, and constituted a large problem. Every time a crop was taken from a piece of land, the soil was impoverished of nitrogen. There was plenty of nitrogen in the air, but it was in the form of free nitrogen, whereas plants could only absorb combined nitrogen. The question arose, how the leakage of nitrogen

from the soil could be made good. At present it was made good in several ways, but chiefly by the use of nitrogenous products, like Chile saltpetre.

Many years ago a chemist named Henry Cavendish performed an experiment showing that combined nitrogen could be formed by passing the atmosphere between an electrical spark. A thunderstorm did a lot of good in replacing the leakage of nitrogen by forming nitrogenous compounds as a consequence of the electrical discharges, these compounds then being washed on to the soil by rain. Even in a temperate climate like ours, the amount of nitrogen which enriched the soil by this agency was 11 lb. per acre per annum, and in the tropics the amount was much greater. But in spite of this and other methods of replacing the leakage, it remained a great problem. The Norwegians were producing a fertiliser by passing the atmosphere through a whole field of electrical sparks. After various processes a substance was obtained which was very much like Chile saltpetre, except that it contained calcium instead of soda. The lecture was illustrated by several lantern slides, showing the wonderfully improved results obtained in the growth of plants by an adequate diet of nitrogenous and other fertilisers

Farina from Potatoes

Process and Plant at King's Lynn Factory

Mr. H. W. Richards, managing director of the British Farina Mills, Ltd., in an article in the current number of the Journal of the Board of Agriculture, describes the processes carried on in the manufacture of Farina from potatoes. Prior to the war the industrial use of potatoes was unknown in this country, though Germany, Holland and Japan had developed it with great benefit to agriculture and their export trade. During the war the British Farina Mills, Ltd., arranged to furnish home supplies of pot to flour, to replace that previously obtained from Germany. Contrary to the impression usually conveyed by the term "potato flour," this product does not consist of potatoes dried and pulverised, but is the pure starch separated from the rest of the potato and called Farina. Describing the process and plant, Mr. Richards writes:—

"The manufacture of Farina is a continuous process, and the extraction of the starch is accomplished by means of grinding and washing. After two preliminary washings of the potatoes to remove the earthy matter, they are ground to a very fine pulp; this process serves to free the starch grains from the tissue in which they have been deposited. Then follow the sifting and washing processes of the starch, in order to separate the fibrous portions of the potato. Next comes the treatment which is perhaps the most vital of all, a prolonged washing by a special process, removing all flavour and discoloration and foreign matters. Finally, the operations of drying and dressing produce a fine, glistening white flour.

"The factories needed must have a great floor space, and very large storage room is used also for keeping and preparing the potatoes. The first factory, which started six months ago, is at Alexandra Docks, King's Lynn, and comprises three large buildings, of seven stories high, with a floor space of 130,000 sq. ft., and a power and lighting station which is fitted with engines of 575 h.p. and auxiliary steam-raising plant. The potatoes are handled mechanically from the dockside if they come in barge or steamer, and conveying bands take them right into the warehouse or into the machines. Railway lines are laid round each building so that incoming trucks can be dealt with at every point, all raw material handled automatically, and the finished product loaded for despatch. All the other mills are on much the same lines, and each one will be able to deal with 1,500 tons of potatoes per week; thus these mills should use over 200,000 tons of potatoes during the year.

"Farina is principally used by the textile trades, which are the largest consumers, and very large supplies are required also for the manufacture of dextrine and various classes of gums and other products of a like nature. In addition there are many other uses for it amongst manufacturing chemists, some of those developed in other countries being the production of artificial sago and grape sugar."

Recent Wills

	£
Mr. Walter Mitchell Crowther, of Field House, Gomersall, Yorks, retired manufacturing chemist	22,532
Alderman A. Peel, of the Manor House, Bradford, principal of Peel Brothers, Ltd., a branch of the Britain Cotton and Wool Dyers' Association	25,592

Merchandise Marks Committee

The President of the Board of Trade has appointed a Committee to consider:—(1) Whether any extension or amendment of the Merchandise Marks Act is required in respect of the provisions relating to indications of origin; (2) the utility and effect of National Trade "Marks" or other similar (collective) marks, and how far they should be authorised or encouraged in this country; (3) How far further international action may be necessary for the purpose of preventing the false marking of goods.

The members of the Committee are:—Mr. Harry Green, M.P. (chairman); (representatives of the Association of Chamber of Commerce) Mr. M. B. Dickie (Nobel's Explosives Co.), Mr. J. Evans-Jackson (Messrs. J. Evans-Jackson & Co., patent agents), Mr. C. A. Hyde (Birmingham Small Arms Co.), Mr. R. T. Wilson (Cutlers' Company, Sheffield); (representatives of the Federation of British Industries) Mr. J. Hood, M.P. (British-American Tobacco Co.), Mr. Lennox B. Lee (Calico Printers' Association); (representative of the Irish Industrial Development Association) Colonel Sir Nugent T. Everard, Bart.; Mr. G. Hayhurst (Co-operative Wholesale Society), Mr. G. A. Moore (Messrs. G. A. Moore, Liverpool), Mr. T. Pratt (President of the National Chamber of Trade), Mr. D. M. Kerly, K.C.; Mr. H. Fountain, C.B., C.M.G., Mr. W. Temple Franks, C.B. (Board of Trade); and Mr. N. E. Behrens (a Commissioner of Customs and Excise).

The Secretary is Mr. M. F. Levey, of the Industrial Property Department of the Board of Trade, and all communications on the subject of the Committee should be addressed to him at the Patent Office, 25, Southampton Buildings, W.C. 2.

German Heavy Chemical Trade

The eight German chemical companies which since 1916 have formed the enlarged community of interests in the heavy chemical industry, including the production of aniline dyes, have convened special meetings of the shareholders, it is stated, for this month, in order to submit proposals for increasing the share capital. Apart from new preference capital, which is to be interchanged between the companies so as to render their relations of a more intimate character and fortify their competitive capacity in external markets, the aggregate amount of the combined new issues of ordinary capital is 380,000,000 marks, which would represent £19,450,000 if the mark were at its normal value. In fact, each company is virtually to double its ordinary capital. The companies concerned are the Bayer Co. of Ieverkusen, the Badische Anilin und Soda Fabrik of Ludwigshafen, Meister Lucius and Bruning of Hochst, L. Cassella and Co. of Frankfort-on-Main, the A. G. fur Anilin Fabrication of Berlin-Treptow, the Griesheim-Elektron Co. of Frankfort, Weiler-ter-Meer, and Kalle and Co. of Biebrich. The proposed increases in the ordinary share capital, which are to be taken over by banking syndicates and then offered to existing shareholders at 107 per cent., are to be made in instalments, partly this year and partly during next year.

German Chemical Factories

The Nottingham Section of the Society of Chemical Industry opened the session with a lecture by the Chairman, Mr. F. H. Carr, F.I.C., in the University College, last week, on the subject of "Impressions Gained on a visit to German Chemical Factories." He said that last January he paid a visit to Germany. The German people had shown a remarkable example in the chemical industry, and much could be learned by a comprehensive study of their methods. They put as much pride in their chemical industry as we did in the engineering and textile trades in this country. Regarding the factories, special reference was made to the co-ordination between the various German firms. This movement had been going on for the past 18 years, and in 1916 it reached its culmination. Large firms combined and made groups, and the manufacture of any specific article was left to the firm which could produce it at the cheapest rate. As a result of huge combinations in the manufacture of heavy chemicals, dyes, drugs, photographic chemicals, &c., there was a remarkably high standard of product.

From Week to Week

Mr. Frank Fisher, Secretary to the Dyers' Association, has been placed on the Commission of Peace for Brighouse (Yorks).

The Dean of Guild Court, Grangemouth, has granted permission to the Scottish Dyes, Ltd., to build new factories.

Plans have been passed for additions to Welsbach Light Co.'s factory, Broomhill Road, Southfield, Streatham.

Mr. A. R. Duncan has been appointed Coal Controller in the place of Sir Evan Jones, M.P., who recently resigned.

Prohibition of the exportation from the Netherlands of acetic acid has been temporarily raised.

Captain A. S. Russell, D.Sc., (Glasgow) has been appointed Dr. Lees Reader in Chemistry at Christ Church College, Oxford.

It is stated that the Swansea Harbour Trust has granted an application from T. P. Rose Richards, Ltd., for a lease of land at the King's Dock for the erection of patent fuel works.

Mr. E. de Barry Barnett has been appointed to the post of lecturer in organic chemistry at the Sir John Cass Technical Institute, Jewry Street, Aldgate.

Damage estimated at £3,000 was caused by a fire on Saturday, October 25, at the premises of Messrs. Peet & Co., Ltd., slubbing dyers, Otley Road, Bradford.

Mr. Robert Peachey has been elected Master of the Painter-Stainers' Company, and Mr. Henry J. Newman Master of the Distillers' Company.

It is stated that arrangements have been concluded for the shipment of 6,000,000 tons of gas and steam coal from the United States to Continental ports.

At Fakenham, Norfolk, on Monday, a grocer was fined £5 for selling an olive oil substitute which, on analysis, was found to be refined paraffin, artificially coloured. It was stated that the price charged worked out at £3 2s. a gallon.

Sir Richard Glazebrook, late director of the National Physical Laboratory at Bushey House, Bushey Park, is to be presented in December by the staff with his portrait in oils, the work of his cousin, Mr. H. Glazebrook.

Messrs. Vickers, Ltd., Barrow, have received an order for the construction of a big oil-carrying steamer for the fleet of the Anglo-American Oil Co., Ltd., this being the second order placed by the firm with the Barrow company.

Sir Henry Miers, Vice-Chancellor of the University of Manchester, has been appointed a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

Dr. J. W. Mellor has been engaged for the last twelve years on the preparation of a compendious survey of Inorganic and General Chemistry. This is described as the most comprehensive work on the subject in the English language. It will probably consist of six large volumes, and Messrs. Longmans, Green & Co. have the first instalment in the press for publication in 1920.

The following are among the latest firms which have given an undertaking to employ as many disabled ex-service men as possible, with a minimum of 5 per cent. of their total establishment:—Bradford Dyers' Association, British Petroleum Co.; sugar refiners like Messrs. Henry Tate & Sons, and Messrs. McFie & Sons, and the Gt. Grimsby Coal, Salt & Tanning Co.

An interesting feature of an exhibition at Kingston-on-Thames Free Library by the Knox Guild of Design and Crafts is a demonstration of simple methods of dyeing. Woollen stuffs woven by members with primitive apparatus have been dyed with privet, bracken, gorse, and other plants, and even with chimney soot, the last-named producing a beautiful old gold tint.

According to *Stubbs' Weekly Gazette*, the failures in the United Kingdom for the week ended October 25 were 25, an increase of eight. The number of bills of sale registered and re-registered was 134, an increase of 67. Mortgages and charges registered by limited companies amounted to £799,691, the amount authorised (where stated) being £244,500.

Shoreditch Profiteering Committee considered a complaint against a local dealer for charging 10d. for a quarter of a pound of bi-chromate of-potash, a chemical used for making a mahogany stain, and it was stated that before the war it was obtained at 8d. per lb. The chairman said the invoice submitted by the respondent showed a profit of 40 per cent. The committee ordered 1d. to be returned to the complainant.

Experiments on the fixation of atmospheric nitrogen upon which large sums were expended prior to the war, and which were suspended during the war, have now been resumed by British Cyanides, Ltd. The experiments will take many months to develop, but the special furnaces erected have now overcome some of the chief difficulties which the company were endeavouring to solve.

Chemical engineering classes have been arranged for the winter session at the Birmingham Municipal Technical School. These classes last year were very successful, and the new course will consist of thirty lectures for which Mr. W. A. Twine, chemical plant superintendent, Birmingham Corporation Gasworks, will be responsible. He has had a wide experience in chemical engineering and technology, and in his lectures he makes full use of lantern and blackboard in showing chemical plant and processes.

The Board of Trade are about to leave Whitehall Gardens for their new offices in Great George Street. The President, Parliamentary Secretary, Permanent Secretaries, the Commercial Relations and Treaties Department, the Industries and Manufactures Department, the Power, Transport and Economic Department, the Marine Department, the Legal Department, the Secretariat of the Board of Trade Council, the *Board of Trade Journal*, and the Establishment Department will form the nucleus that is being transferred now, and more departments will follow as further accommodation becomes available.

The Finnish Commercial Attaché in London has notified the Board of Trade that the restrictions on the importation of fertilisers (Tariff No. 874) has now been removed. The complete specification of No. 870 of the Finnish Customs Tariff is as follows:—"Bone meal and horn meal; guano (even natural) and other fertilisers of animal waste; Chili saltpetre (or nitrate of soda); lime saltpetre (Norwegian saltpetre); nitrogen carbide (nitrate of lime); sulphate of ammonia; potash salts from salt mines, even if refined; Thomas slag, even if ground, and superphosphate."

In a statement issued by the Association of British Chambers of Commerce, showing the supplementary amendments to the Trade Marks Bill put forward by the Executive Council of the Associated Chambers, it is pointed out with reference to chemical substances that in Clause 6 (2) of the Bill, the words "any single chemical substance" are very vague, and it is thought that a person who obtains a word trade mark for a chemical substance ought not to suffer forfeiture of that trade mark unless he uses it in such a way as to prevent the public from being able to call the chemical substance by any other name.

Following negotiations between employers and men in the dyeing industry, the Bradford Dyers' Association have offered to increase the basis rates of time workers, the increase to be varied point for point with the Ministry of Labour's cost of living index each quarter. Piece rates also are to be advanced. The alterations date from September 20, and mass meetings of members of the Amalgamated Society of Dyers held at Bradford on Friday, October 24, decided to accept them. The new rates will represent an increase of 8 per cent. to time workers with war wages at 115 per cent., and 5 per cent. to piece workers with 92 per cent. war wages.

At a meeting in the House of Commons on Wednesday of the Select Committee on High Prices and Profits, Major Barnes put some questions regarding the Government interest in the British Dye Stuffs Corporation. Sir Auckland Geddes said that no new money was put into the Corporation. It was the same money which was set aside to help the British dye industry. Major Barnes pressed for further inquiry, and said that enormous profits had been made in the industry, and excessive prices were being charged, while the Government were stabilising these profits by its interest. Sir A. Geddes said he could not agree to any one of those statements. The Chairman ruled that further questions on the point should be made in the House.

According to the report of the Quebec Bureau of Mines the production of asbestos in the province reached a new high record in 1918, and the industry is in a highly prosperous state. Both the tonnage and the value of the product exceeded all previous records. Asbestos in the shape of "crude" and "mill-stock," was shipped to the amount of 142,375 short tons, to which is to be added 16,850 tons of "asbestic" a by-product of low price, or in all a total tonnage of 159,225. The value of the asbestos proper

was $9,019,899, or with the " asbestic " $9,053,945. As compared with the previous year's figures, 154,452 tons valued at $7,240,697, this shows an increase of 4,773 tons, or 3.1 per cent. in quantity, and $1,779,202, or 24.5 per cent. in value.

THE FIRST MEETING of the session of the Newcastle section of the Society of Chemical Industry was held in the Armstrong College on Monday night, when Professor W. A. Bone, F.R.S., spoke on the second report of the British Association Fuel Economy Committee. Professor P. P. Bedson presided over the meeting, and explained that they had succeeded in persuading Professor Bone to address them, as he was in the district on another engagement at the time. He mentioned that the vice-president of the section, Mr. H. Peile, had received the degree of D.Sc. from Durham University. In the discussion Professor Henry Louis, Dr. J. T. Dunn, Mr. T. Hardie, Mr. G. Weyman, Professor Bedson and others took part.

A LARGE GLASS PLANT for the manufacture of bottles and table and illuminating glassware has recently been erected at Havana, Cuba. This is the first plant of its kind in Cuba (says the United States Bureau of Mines Report), and the outlook for its success seems promising. One of the factors most favourable to the establishment of the glass industry in Cuba is the supply of raw materials available on the island. The new company controls about 3,000 acres of glass sand, with an average content of 99.43 per cent. silica, and has ample resources of high-grade limestone.

H.M. MINISTER AT CARACAS, Venezuela, has forwarded to the Board of Trade extracts from mid-August issues of the *Gaceta Oficial*, which invite tenders for the right to explore and exploit deposits of coal, petroleum, and similar substances in various districts of the States of Cojedes, Nueva Esparta, Tulia, Tachira, Trujillo, and of the territory of Delta-Amacuro. The time granted for the presentation of tenders has been extended to six months in the case of the State of Cojedes, and to five months in the case of the other States, to run from the date of publication of the respective notices. Propositions must contain all data and fulfil the conditions required by Articles 5 and 6 of the Mining Law.

IN REPLY TO THEIR LETTER to the Board of Trade urging that steps should be taken to secure an adequate supply of dyewares for the woollen and other industries, the Batley and Birstall Chamber of Commerce have received a letter from the Board, which says :—" The Board fully appreciate the necessity for securing a supply of such essential dyestuffs as are unobtainable in sufficient quantities from British sources of manufacture, and with this object in view are making arrangements, which it is hoped will be completed in the near future, for securing an interim supply of such dyestuffs from Germany under the terms of the peace treaty. An announcement as to these dyestuffs and the manner in which they will be available to consumers will shortly be made."

MR. J. M. DRAPER, Cardiff, who was associated with the late Lord Rhondda in coal purification research, delivered a lecture at Wolverhampton last week on Hydraulic Separation, a process well known in the South Wales coalfields as applied chiefly to the separation of coal from shale or rubbish. Mr. Draper said our coal was getting less every year, and we should be compelled to tackle the dirtier and thinner seams. There was no great profundity of research, but they had in South Wales evolved with complete success a simple apparatus for the marketable utilisation of " dross," which in the bad old days and not infrequently in the present, was thrown away, left in the pit, or sent to the tip. The new apparatus would clean 150 tons per hour, and it was claimed that by its use the life of the Rhondda coalfield had been extended by twenty-five years.

THE REPORT OF MR. LEWIS HAMILTON to the Oil Trust on the prospects of exploiting oil in its Cuban properties is of interest in view of the report that the Cuban Railways are following the example of the Argentine companies and adapting their engines for the use of oil. According to Mr. Hamilton, indications of oil are manifested in several ways, more especially by bitumen veins, seepages of asphalt (Maltha), gas issues, and oil sands. Almost everywhere manifestations of one kind or another have been reported associated with nearly every geological series that appear in the island. The Havana Oil Co., having acquired a licence from the Oil Trust, Ltd., to bore for oil over a tract of its territory of approximately 5,000 acres, and having just provided additional capital to the amount of £125,000, a thorough geological examination of the whole area will now be made.

THE COMMITTEE appointed by the Board of Trade to enquire into the non-ferrous mining industry met last week under the chairmanship of Mr. H. B. Betterton, M.P., when Mr. H. Rich, a director of Tincroft Mines Ltd., and Mr. William Thomas, the general manager of the Tincroft mine, gave evidence. In their opinion an amalgamation of the mines in the central district would be advantageous. Mr. Rich said the Government should make a grant of £1,000,000 for this purpose, and he instanced the advance made by the Government to the Anglo-Persian Oil Co. as a precedent. He thought that in view of the services rendered to the country by the Cornish tin mining industry in the time of national emergency, the sympathy of the Government should assume practical shape in the manner indicated. Mr. W. Thomas gave technical evidence as to the position and prospects of the lodes in this area, and generally concurred with Mr. Rich.

REPLYING TO REPORTS respecting the position of the English Chemical Glass Industry, the Council of the British Chemical Ware Manufacturers' Association, Ltd., have issued an explanatory statement in which they deny the assertion that the industry has been protected for five years, the restriction on imports not having been put into force until February 23, 1917. With regard to tumblers they say that the price of a half-pint common glass is not, and has never been, as high as 1s. 4d., but is under 6d. and has never been higher than that figure. Respecting the profits alleged to have been made by manufacturers they point out that none of the members of the association, who during the war under the greatest difficulties undertook the manufacture of chemical glass ware, has made any profits, and moreover they have spent large capital sums in order to establish the industry in this country, without, as yet, receiving any return.

Supply of Phosphate Fertilisers

Shortage in South Africa

A SERIOUS shortage of phosphate fertilisers (the *Times Trade Supplement* states) has prevailed in South Africa for nearly three years, owing to the falling off of imports. With a view to alleviating the position continuous inquiries have been made by the Industries Advisory Board of the Department of Mines and Industries, in order to ascertain the possibilities of replacing imports by locally manufactured fertilisers. Strenuous efforts were made to get the refuse from abattoirs and fisheries utilised. No unwillingness on the part of municipalities and canning companies to utilise their waste products was met with; the main obstacle was the difficulty of obtaining the necessary digester plants. Though engineering firms in Johannesburg expressed their readiness to manufacture digester plants, very little has yet been done to obtain phosphate fertiliser from this source.

In order to hasten the steps which were being taken towards the utilisation of the Saldanha Bay phosphate deposit by the owners, laboratory tests were made by the Scientific and Technical Committee of the Department of Mines and Industries with the " Wolter " process for rendering the phosphoric oxide soluble, with satisfactory results. Working-scale trials were also made, and in view of the desirability of making the finished product available to farmers at reasonable prices should the experiments prove satisfactory, the Industries Advisory Board resolved to bring to the notice of the Minister for Mines and Industries the fact that the necessary safeguards must be taken in connection with the experiments being made so as to prevent the possibility of a monopoly being created in this necessary article. Later, a new company having been formed to work the deposit, it was decided to discontinue the investigations which the committee had in hand, as it was felt that the object which the Government had in view, namely, the commercial treatment of the rock, was in sight, and that the company could be depended upon to provide a supply of fertiliser from this source. A satisfactory process has been evolved, and, since the competition of imported fertilisers will in due course manifest itself, nothing in the nature of a monopoly need be feared.

Imports of manures and fertilisers of all kinds into the Union of South Africa during the first six months of the current year were 1,389 tons, as compared with 59,651 tons during the year 1914. The tonnage decreased to 52,330 in 1915, to 30,407 in 1916, to 9,077 in 1917, and rose again to 14,792 in 1918.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 4, Queen Anne's Gate Buildings, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
Australia (Melbourne)	Glass	908
(Sydney)	Chemicals in bulk	912
New Zealand (Dunedin)	Heavy Chemicals, salt, scouring soaps, dyes, olive oil, glass bottles, &c.	940
(Dunedin)	Lubricating oils and greases	941
Netherlands (Tilburg)	Tanning extracts	961
Norway (Stavanger)	Oils	962
Algeria (Oran)	Soap, oils	972
Athens	Chemicals and pharmaceutics	959
Johannesburg	Superphosphates and heavy chemicals	944
Australia (Sydney)	Chemicals	912
Santiago de Chile	Drugs	978
Spain (Malaga)	Chemical Fertilizers	969
Seville	Chemicals and pharmaceutical products	970

Contracts Open

Railway Stores.—(5) Cement and lime; (9) drysalteries; (14) glass (plate and sheet), lamp chimneys, &c.; (27) soap and candles. For the Great North of Scotland Railway Co. Particulars from the Stores Superintendent, 80, Guild Street, Aberdeen. Tenders by 10 a.m., November 27.

Railway Stores.—(5) Zinc, spelter, &c.; (12) colours, &c. (ground in oil and dry), and Hall's distemper; (13) drysalteries; (16) carbide of calcium for acetylene gas lighting; (23) glass; (26) asbestos, &c.; (29) lead (ground in oil and dry), sheet, &c.; (33) oils, burning, lubricating, &c.; (46) varnishes, &c. Particulars from the Secretary, Amiens Street Station, Dublin. Tenders by 10 a.m., November 11.

Stores.—(9) Oils and grease; (10) paints and shellac; (11) spirits, acids, drysaltery, and disinfecting fluid; (13) soap, &c.; (15) glass. Particulars from Mr. R. H. Wilkinson, Tramways General Manager, 7, Hall Ings, Bradford. Tenders by November 15.

Chemical Warfare on Rats

In some correspondence in the *Times* on the most effective chemical method of exterminating rats, Mr. W. Glen Liston, late Senior Member of the Plague Research Commission, states that experiments carried out in India showed that barium carbonate was the most reliable poison for rats. In reply to the suggestion that barium carbonate also destroys poultry, the Board of Agriculture state that any loss of poultry from this cause is probably due to the use of too large doses. Mr. Boulengerl in his report on the methods of rat destruction, recently published by the Zoological Society, states that "much time was spent testing various preparations, of which barium carbonate formed the basis, this rat poison having been selected as the most suitable by the United States Department of Agriculture and the Indian Government. Although 1½ or 2 grains suffice to kill a rat, barium carbonate is more or less harmless to domestic animals, cats and chickens withstanding 10–15 grains and an average sized dog over 100 grains." No accidental loss attended the several experiments made.

Chemical Matters in Parliament

Importation of German Goods

In reply to questions by Major Sir Bertram Falle and Mr. Bottomley (House of Commons, October 27), the President of the Board of Trade (Sir Auckland Geddes) stated that the requirements in regard to the marking of German goods were the same in every way as those applicable to goods imported from any other country. They were set out in a Memorandum issued by the Commissioners of Customs. Speaking broadly, goods were only required to bear on importation a definite indication of their country or origin when they already bore marks which without that indication would be calculated to deceive. He had recently appointed a Committee to inquire *inter alia* into the question whether the law at present in force in regard to this matter required any extension or amendment.

Import Restrictions

In reply to Mr. Remer, who drew attention to the fact that among other imports 1,000 barrels of soap, 536 cases of glass (including 229 cases of window glass, one case of glass bottle samples, and ten cases of flint glass) and 195 bags of glue had recently arrived from New York, Antwerp and Rotterdam, Sir A. Geddes stated that his attention had not previously been drawn to the various cargoes mentioned, which appeared to consist almost entirely of goods the import of which was not subject to any restrictions. The general policy of the Government was stated by the Prime Minister before the Recess and would be embodied in legislative proposals shortly to be laid before the House.

Trade and Commerce

In reply to Sir A. Williamson (House of Commons, October 27) Mr. Bonar Law said that the Report of Lord Cave's Committee to examine the question of Government machinery for dealing with trade and commerce had been accepted as a provisional scheme, subject to reconsideration if it should not be found to work sutisfactorily; steps were being taken to give effect to its recommendations, and some of the most important of these had already been carried out, namely, the transfer of the Consular Department of the Foreign Office to the Department of Overseas Trade, and the setting up of a Standing Committee comprising representatives of the Foreign Office, Board of Trade, and the Department of Overseas Trade, to deal with questions in which the three Departments were jointly interested.

Gretna Factory

In reply to Major Murray (House of Commons, October 27), Mr. Kellaway stated that the whole question of the retention of Gretna and certain other national factories to form a nucleus of munitions manufacturing capacity was being considered afresh in the light of recent developments. Meanwhile no decision could be come to as to the publication of the Departmental Report.

National Cattle Food Trade Association

Asked the reason for not including a representative of the National Cattle Food Trade Association on the Royal Commission on Agriculture, and why no representative of the makers of cattle food was appointed a member of the Royal Commission, Sir A. Boscawen (House of Commons, October 27) said it was not considered desirable to include representatives of any trade associations as such in the list of persons recommended for appointment.

Roumanian Petroleum Resources

In reply to Mr. Spoor (House of Commons, October 28), Mr. Harmsworth stated that the possibility of increased co-operation of British interests with Roumania in the development of her petroleum resources was discussed some time ago with the late Prime Minister of Roumania, but there have been no recent negotiations on the subject.

The Price of Quinine

Mr. Spoor (House of Commons, Thursday, October 30) asked the President of the Board of Trade, whether he is aware that the whole of the quinine (chinchona) production of the world, apart from the small quantity produced by the Government of India for local use, has lately been made the subject of a monopoly of the Dutch and British producers; whether he is aware that this monopoly is fortified, so far as this country is concerned, by an equally firm monopoly of the wholesale chemists of the United Kingdom; whether he realizes that the consumer is now being charged 3s. 6d. per oz. as compared with 1s. or even less pre war; and what steps he proposes to take to enable this commodity to be obtained without profiteering.

Mr. Bridgeman, who replied, said: The answer to the first part of the question is in the affirmative. The whole question of the prices and supply of quinine sulphate to this country is being investigated under Section 3 of the Profiteering Act, and I hope that the findings of the investigators will be ready for publication before the end of this week, or, at latest, next week.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

COAL. Coal and its conservation. W. A. Bone. *J. Roy. Soc. Arts*, October 24, 751-760. The second of a series of Cantor Lectures, advocating a national policy as regards the utilisation of coal. (See also CHEMICAL AGE, p. 527.)

COMBUSTION. Flame velocity in inflammable gases. J. D. Morgan. *Engineering*, October 24, 535-536. The author's work indicates that flame velocity is proportional to gas pressure during combustion.

Colonial

COTTON. Action of dilute sulphuric acid solutions upon the tensile strength of cotton yarn. W. A. Lawrance. *Canadian Chem. J.*, October, 329-331. Tests on cotton are described, also experiments which indicate the best conditions for carbonising wool.

EDUCATION. The value of scientific work and the training of chemical engineers. *Canadian Chem. J.*, October, 335-340. A report of the proceedings of the Chemistry Committee of the Honorary Advisory Research Council (Canada).

ELECTRIC FURNACES. The future of the electric furnace. C. T. Bragg. *Canadian Chem. J.*, October, 334. Abstract of paper read before the American Institute of Chemical Engineers.

French

ACETATES. Determination of pyrolignite of iron. G. Vié. *Ann. Chim. Analyt.*, October 15, 311-312.

CHLORINE. The liquefied chlorine industry in France during the war. *Rev. Prod. Chim.*, October 15, 501-506. The production of liquid chlorine by different processes, its uses and output are described.

MOTOR SPIRIT. Analysis of German petroleum spirit used for aircraft. G. Chavanne, L. P. Clerc, and L. J Simon. *Comptes rend.*, October 25, 693-695. Analyses of twenty-two samples of aeroplane engine spirit are given.

TIN. Determination of tin. F. la Naour. *Ann. Chim. Analyt.*, October 15, 308-309.

German

ANALYSIS. Chemical analysis with the aid of membrane filters. R. Zsigmondy and G. Jander. *Z. anal. Chem.*, vol. 58, Nos. 6-7, 241-280. A full account of the technique of the use of collodion membrane filters in analytical work, with examples of their use in different estimations.

Iron sulphide as indicator in acidimetry, and a new process for estimating zinc. J. Houben. *Ber.*, September 27, 1613-1621.

Report on the progress of the analysis of metals in 1917-1918. T. Döring. *Chem. Zeit.*, September 30 and October 4, 653-655, 665-668. The analysis of antimony, tungsten, manganese and iron is dealt with.

EDUCATION. The education of textile chemists. A. Kertesz. *Z. angew. Chem.*, October 7, 315-317.

ENAMELS. Fuel consumption of muffle furnaces in the enamel industry. L. Vielhaber. *Keram. Rundsch.*, September 25, 293-295.

FATS. Catalytic reduction of fats by means of palladium. F. F. Nord. *Z. angew. Chem.*, September 30, 305-309. Studies with rapeseed, castor, cottonseed, soya bean, arachis, and whale oils are recorded.

FUEL. Solid fuels in 1917-1918. W. Bertelsmann. *Chem. Zeit.*, September 25 and October 7, 641-643, 673-674. A review of the literature on wood, lignite, coal, and briquettes.

GAS. New gas-producer plant. R. Krieger. *Stahl u. Eisen*, October 9, 1197-1204. An account of the Bender and Frambs system as used in a German steel-works.

Gasification of lignite in modern rotary hearth producers. K. Neumann. *Stahl u. Eisen*, October 16, 1233-1239. Results of trial runs are recorded.

IRON. The recrystallisation of iron. P. Oberhoffer and W. Oertel. *Stahl u. Eisen*, September 11, 1061-1067. A useful paper, accompanied by many photomicrographs.

METALLURGY. Mechanical furnaces for roasting pyrites and blende. Schefczik. *Chem. Zeit.*, October 2, 661-662. A discussion of the merits of different types of furnace.

MINERAL OILS. Contribution to the chemistry of hydro-carbons. Volumetric estimation of olefinic constituents in benzine and illuminating oils. J. Tausz and H. Wolf. *Z. angew. Chem.*, October 7, 317-319.

ORGANISATION. The affiliation of chemists. Schellwisn. *Z. angew. Chem.* (*Wirts. Teil*), September 20, 645-646; also E. W. Albrecht, *ibid.*, September 30, 653.

SODIUM SILICOFLUORIDE. Analysis of sodium silicofluoride. P. Drawe. *Z. angew. Chem.*, September 20, 312.

Oil Industry in Poland

Favourable Attitude of the Government

MR. LEAMA R. DAVIES (Chairman of the Company), who, with Mr. Dalglish, has recently returned from a visit to Ratoczyn, presided at the sixth ordinary general meeting of the Ratoczyn (Galicia) Oil Co., Ltd., held in London last week. Mr. Davies said that the company had resumed entire control at Ratoczyn, that no damage had been done, in spite of many narrow escapes, and that the property was greatly improved and developed, and more valuable generally than before the war. Their property formed a self-contained area of about 100 acres, the whole of which had been proved to be oil bearing; most of the wells were near the eastern boundary, but one had been sunk close to the western boundary, and although it had not yet reached the proper oil horizon, much gas and a considerable amount of oil had been obtained by eruptions. There was room on the property for approximately 100 more wells. Negotiations were in course for the early delivery of plant, casing, &c., in order that work on the wells might be resumed. The output for September was 2,060 tons. He and Mr. Dalglish had visited Warsaw, to find out from headquarters the position of the oil industry *vis-à-vis* the Government. They had had an interview with the Minister of Foreign Affairs, Mr. Szczepanski, and from the assurances that gentleman had given them, they were confident that the Polish Government would do everything to foster the oil industry. The Minister had also spoken of the desire to encourage British commercial enterprise in the new Poland. There was a general feeling of friendliness towards Great Britain amongst all classes of Poles, and visitors from this country might be sure of a cordial welcome.

THE NEW COMMERCIAL LIBRARY IN MANCHESTER, which is established in the Royal Exchange, and is accessible to the public generally, as a branch Free Library, will be of some value to the chemical engineering trade. It is not a technological library, but trading interests are well considered, and the information available is world-wide. The librarian (Mr. Irwin) informs our Manchester correspondent that those interested in industrial chemistry and allied trades may consult at the library classified periodicals relating to these subjects from different parts of the world. Trade circulars in considerable number may also be seen there.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts of Complete Specifications

120,205. Evaporating Liquids, Process for. E. Morterud, Torderöd near Moss, Norway. International Convention date, October 26, 1917.

Liquid is evaporated by means of the heat of condensation of the compressed vapour from the same liquid, and in order to obtain an efficient heat transmission the use of a solid separating surface is dispensed with, and another heat-transmitting liquid, heated by direct contact with the compressed vapour, is used. The transmitting liquid and the liquid to be evaporated are spread over irrigation surfaces, and heat is conveyed by a current of the resulting vapour passing over them. Alternatively the surfaces may be arranged adjacent to one another, the two liquids being spread over alternate surfaces, so that heat-transference takes place by radiation. In another form the heat-transmitting medium may be a solid.

126,628. Zinc Sulphide and Barium Sulphate, Process for the Conjoint Manufacture of. P. Desachy, 14, Rue Emile Augier, Paris. International Convention date (France), October 19, 1917.

Zinc sulphate solution is mixed with barium hydroxide, carbonate, or sulphite, producing a mixture of barium sulphate and zinc hydroxide, carbonate, or sulphite. Hot sodium sulphide is then added, producing a mixture of zinc sulphide and barium sulphate in each case, with a solution of sodium hydroxide, carbonate, or sulphite. Instead of sodium sulphide, a hot solution of barium sulphide may be used. The precipitate is filtered, washed, calcined with a small quantity of sulphur, and finally cooled out of contact with air. The product may be used as a pigment.

127,555. Thorium Compounds, Extraction and Purification of. Lindsay Light Co., Chicago, Assignees of L. W. Ryan, 161, East Grand Avenue, Chicago, Ill., U.S.A. International Convention date (U.S.A.), May 29, 1918.

A source of thorium, such as monazite sand, is baked with sulphuric acid, leached, and the solution purified by repeated crystallisation. A solution of the sulphate is then treated with hydrofluoric acid or a soluble fluoride to precipitate thorium fluoride, which is then treated with strong sulphuric acid to convert it into anhydrous thorium sulphate. The sulphate may be treated with sodium carbonate solution to produce thorium carbonate solution, or with caustic soda to produce the hydroxide, either of which may be further treated as required.

132,815. Cellulose, or Material Containing Cellulose, Manufacture of Solutions of. A. G. Bloxam, London (*From Zellstofffabrik Waldhof, of Mannheim-Waldhof, Germany*). Application date, October 12, 1917.

One part of comminuted sulphite-cellulose pulp is kneaded with 5 parts of caustic soda lye of 17 per cent. strength for half an hour. Water is then added, and the alkaline liquid separated by centrifugal means or by pressing. The residue is washed with acidified and with pure water till free from alkali, and then dried and dissolved in a mixture containing 35 per cent. of hydrochloric acid and 10 to 12 per cent. of sulphuric acid.

132,842. Potassium Permanganate, Process of Manufacturing. Dr. C. Dreyfus and Dr. J. J. Bloch, Deansgate Arcade, 85, Manchester. Application date, August 24, 1918.

Sodium manganate is oxidised to the permanganate by electrolysis in the known manner, and a solution of potassium chloride or sulphate containing the theoretical amount of potassium salt necessary for the reaction is then added. When saturated solutions are used the greater part of the potassium permanganate formed crystallises out of the mixed solutions on cooling. Reference is directed, in pursuance of Sect. 8, Sub-sect. 2, of the Patents and Designs Act, 1907, to Specification 126,756

132,855. Potash from Potash-bearing Minerals, Method of Extracting—and the Manufacture of the Residual Products of such Method of Conversion into Cement. A. C. Auden, 5, Victoria Street, Westminster. Application date, September 23, 1918.

A process is described for the extraction of potash from silicates of alumina and potash, such as orthoclase felspar, pegmatite, mica and micaceous schist, muscovite, china-stone, some forms of zeolite, and silicates of iron and potash, such as glauconite. As an example, felspar is crushed, and 100 parts are mixed with 36 parts of slaked lime and 42 parts of common salt, and the mixture ground in a tube mill to a powder which will pass through a 180 by 180 mesh. The mixture is run into an ordinary muffle furnace, and heated to 900° to 1,000° C. for about one and a quarter hours, *i.e.*, until it is uniformly roasted and contains only a small proportion of "dead lumps," the incomplete roasting being a feature of the invention. The roasted mixture is then raked and sieved again. The residue is re-ground to the same fineness as before, and again subjected to roasting and grinding. The material is then mixed with water at about 75° C. to form a thick cream. If a raw material such as glauconite has been used, the creamy mixture is produced by agitating the roasted material in an autoclave with water and steam under pressure, at a temperature of 200° to 205° C. The creamy mixture is treated in a filter press, and washed with hot water till substantially free from chloride, and the liquor is passed to an evaporator. If glauconite was used, two evaporators in series are employed, to eliminate phosphoric acid. The potash is finally obtained as chloride. The press cake may be converted into cement by kneading it with finely ground unslaked lime in the proportion of 40 to 70 per cent. of the press cake, and preferably also with about 2.5 per cent. of alum. The mixture is slowly heated in a furnace for two to two and a half hours up to 1,100° C. The product is then raked while cooling, and finally sieved, any residue being re-ground to the necessary fineness. The resulting cement may be mixed with 1.5 to 2 per cent. of gypsum, to produce a more slow-setting cement.

132,882-3. Nitrates from Ammonia, Ammonium Compounds, or Organic Nitrogen Compounds, Processes for the Production of—by Means of Bacteria. C. T. Thorssell and Dr. H. L. R. Lundén, Sodra Hamngatan 11, Gothenburg, Sweden. Application date, September 26, 1918.

132 882. Relates to the oxidation of ammonia or its compounds, or organic nitrogen compounds, by means of soil bacteria known as nitrosobacter and nitrosomonas. Substances such as calcium carbonate, magnesia or calcium hydroxide, which act as slightly basic bodies when mixed with water, are placed in layers on a grating in a receptacle, and a solution of calcium nitrate prepared by bacterial oxidation, and therefore containing bacteria, is applied. A dilute solution of the nitrogen compound to be oxidised is added, and air is forced upward through the mixture. Part of the solution containing the oxidised nitrogen compound is then drawn off and fresh liquid added, and the process repeated.

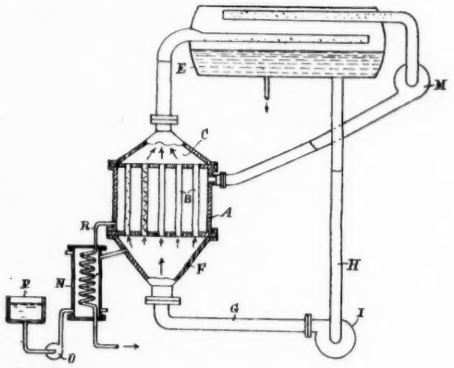
132,883. In the process described in the preceding abstract, the substratum containing the bacteria and the basic material is spread in thin layers on shelves having perforated bottoms, and the liquid to be treated is passed through the layers.

132,885. Rotary Furnace. W. O. Garbutt, 10, Southgate Street, Gloucester. Application date, September 26, 1918.

A rotary furnace comprises an inner horizontal cylindrical chamber of refractory material mounted in a rotary heating chamber by means of adjustable supporting devices arranged around its periphery at close intervals. These devices are adapted to be removed radially from the heating chamber, and some of them may be replaced by rollers, so that the inner chamber can be withdrawn when necessary.

132,893. Evaporating Liquids, Process for. E. Morterud, Torderöd, near Moss, Norway. Application date, October 1, 1918.

The heat of the vapour produced is utilised to heat the liquid to be evaporated. The liquid from the tank P is forced by a pump O through a preheater N and thence to a chamber F. The liquid then passes upward through the tubes B containing baffles, into the space C, and thence to the vessel E. The pump I maintains a circulation of liquid from the vessel E through the pipes H, G, chamber F, and tubes B, back to the vessel E. Vapour

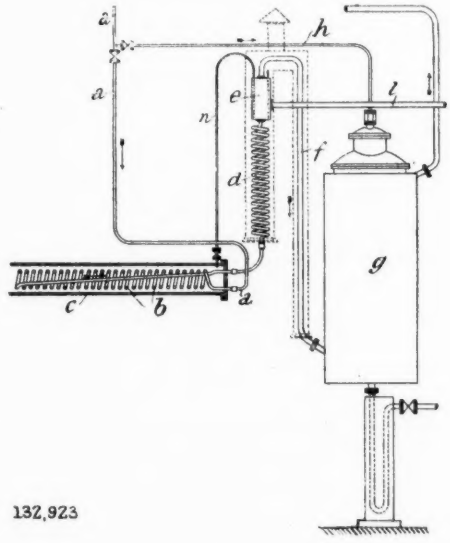


132,893.

from the vessel E is compressed by the compressor M and forced into the heat transmission apparatus A, where it gives up heat to the liquid in the tubes B. The liquid condensed flows by the pipe R through the preheater N where more heat is abstracted to preheat the fresh liquid supplied from the tank P. The hot liquid from the tubes B is sprayed from a perforated pipe into the vessel E which is kept at a low pressure.

132,923. Fuming Sulphuric Acid, Process for the Production of High Strengths of. British Dyes, Ltd., J. Turner, and Dr. W. B. Davidson, all of St. Andrew's Road, Huddersfield. Application date, November 1, 1918.

Hot fuming sulphuric acid, containing 20 to 40 per cent. SO_3 from the first absorber or first absorption stage after the contact



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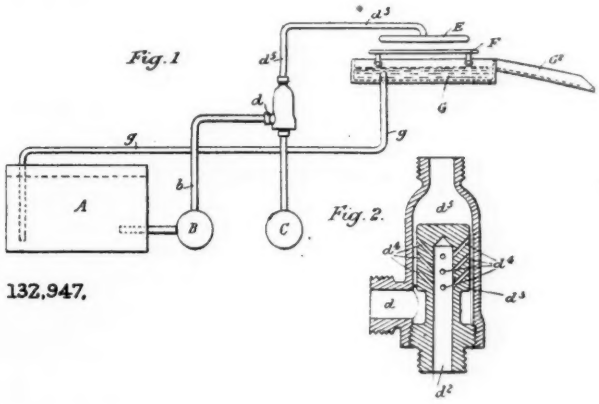
chamber, is run continuously through the pipe *a* to the coil *b* in the gas main *c* following the contact chamber. The acid is thus heated to a temperature at which the sulphur trioxide begins to be liberated, and the acid then passes through a second coil *d* to an expansion chamber *e*, from which the gaseous sulphur trioxide passes through the pipe *f* to a jacketed absorber, scrubber, or washer *g*, supplied with the same strength of weak acid through the branch pipe *h*. A strong acid containing 70 per cent. SO_3 may thus be obtained Hot gas may be passed by the pipe *n* into the expansion chamber *e* to assist in carrying off the gaseous sulphur trioxide. The partly stripped acid is run off from the chamber *e* by the pipe *l*, and returned to a scrubber of the absorption system of the contact plant.

132,947. Colloidal Matter from Liquids, Recovery or Separation of. T. W. Barber, 15, Versailles Road, Anerley, London, S.E. 20. Application date, December 2, 1918.

Liquid containing colloidal matter passes from a tank A through a pump B, pipe *b*, and inlet *d* to the device shown in Fig. 2. Air or other gas is forced by a pump C to the inlet d^2, and is discharged through the perforations d^1, under pressure, into the space d^3, where it mixes with the colloidal liquid. The mixture



132,947.

passes by the pipe d^5, Fig. 1, to a sprayer E, which projects it on to a plate F. This causes the colloidal particles to cohere or combine, and they may be discharged from the surface of the liquid in the vessel G by the spout G^2. The liquid is returned by the pipe *g* to the tank A for re-treatment if necessary. The colloidal matter is thus separated without the aid of chemicals or filtration, and without contamination by other matter which may be held in suspension.

132,960. Fuel Oils. Dr. F. Tinker, 4, Gladstone Road, Erdington, Birmingham. Application date, December 24, 1918.

Specification 130,699 (*see* The Chemical Age of September 13) describes a fuel oil consisting of tars or tar oils mixed with mineral oils by the aid of intermediate oils. It is now found that if about 0.5 per cent. of a solution containing 10 per cent. of ammonia is added, a deposit of carbon or asphaltic matter in the fuel oil is avoided. Other alkalis or soaps may be used instead of ammonia.

132,996. Cellulose Nitrates and Celluloid, Production of Solutions of. R. Gilmour, 40, Ulsterville Avenue, Belfast, and Wm. Dunville & Co., Distillery Street, Belfast. Application date, December 17, 1918.

Cellulose nitrates or celluloid are dissolved in n-butyl formate or isobutyl formate with or without other solvents and/or non-solvents such as acetone, ethyl acetate, or amyl acetate. The solutions may be used for lacquers or varnishes.

International Specifications Open to Inspection

131,588. Bitumen from Coal, Extracting. Rütgerswerke Akt.-Ges., 33, Lutzowstrasse, Berlin. International Convention date, August 9, 1918.

Coal is digested with tar oil at a temperature of 300-350° C. Small coal is added to anthracene oil at 200° C., and the mixture stirred and heated up to 350° C. Volatile oils given off are condensed, and the mass then cooled to 200° C. A further quantity of tar oil is added, the solution is separated and distilled to recover the solvent oil and produce pitch, and the residue may be used as a fuel. When the solution is distilled in high pressure steam, a viscous lubricating oil is produced.

131,600. Ethyl Acetate. Soc. des Acieries et Forges de Firminy, Loire, France. International Convention date, March 13, 1918.

Paraldehyde is oxidised electrolytically by pouring it on to an electrolyte such as a ten per cent. solution of sulphuric acid. The oxidation may be assisted by the addition of oxides or salts such as those of manganese, cerium, molybdenum or vanadium, which are capable of forming more than one oxide or salt, in the proportion of 0.5 to 1 per cent. of the amount of paraldehyde. When the acetic acid produced rises to 40 per cent., an equivalent quantity of alcohol is added and the mixture distilled in a rectifier, producing ethyl acetate. The residue may be again subjected to electrolysis.

Latest Notifications.

133,962. Hydro-carbons, Process and Apparatus for the continuous treatment of—with Liquid Sulphur Dioxide. Allgemeine Ges. fur Chemische Industrie. April 27, 1915.

133,971. Liquids, Vapours and Gases, Purification of. P. H. A. Gaillet. October 18, 1918.

133,972. Pyroxylin Compositions. E. I. Du Pont de Nemours & Co. March 16, 1918.

Specifications Accepted, with Date of Application

123,527. Coke Ovens. Soc. C. M. Stein et Cie. February 22, 1918.

128,180. Kilns. C. H. Zwermann. June 8, 1918.

129,624 Thorium Compounds from Material Containing the Same, Processes for the Separation of. Lindsay Light Co., July 8, 1918.

133,059. Hydrocarbons, Treatment of. G. F. Forwood, and J. G. Taplay. December 12, 1916.

133,075. Oils, Fats, and other Greases from Garbage, House Offals, and other Refuse containing Water, Method of Extracting. F. B. Dehn. (*Cobwell Corporation.*) August 3, 1917.

133,095. Cyanogen Compounds, Process of Producing Substantially Pure. Nitrogen Corporation. June 12, 1917.

133,098 and 133,100. Carbide, Process of, Producing. J. H. Reid. March 13, 1918.

133,101. Calcium Carbide, Preparation of Crude Materials for Manufacture of. F. L. Slocum. March 13, 1918.

133,102. Metal Carbides, Process for the Preparation of Crude Materials for the Manufacture of. F. L. Slocum. March 13, 1918.

133,103. Carbide, Preparation of Crude Material for the Manufacture of. F. L. Slocum. March 13, 1918.

133,104. Nitrogen, Process for the Fixation of. F. L. Slocum. March 13, 1918.

133,105. Cyanogen Compounds and Ammonia, Production of. F. L. Slocum. March 13, 1918.

133,106. Gas or Vapour, Apparatus for Treating Material with. C. C. Stutz. March 13, 1918.

133,159. Gaseous Products from Plants for the Destructive Distillation of Organic Materials, Recovery of. E. Bury, O. Ollander and A. F. Bury. October 4, 1918.

133,217. Liquids, Apparatus for use in the Treatment of—with Gases. H. J. Magrath. December 6, 1918.

133,255. Gas-Producers. F. Clements and W. S. Allen. March 25, 1919.

133,277. Mineral Selective Agent and the Methods of Producing and Using Same. E. C. R. Marks. (*Luckenbach Processes Inc.*) November 4, 1918.

The sale of six and a half acres of certain charitable lands in Stratford-on-Avon for the erection of aluminium works has been approved by the Charity Commissioners on the terms agreed upon by Messrs. N. C. Joseph, the prospective purchasers, and the Town Council. The proposal has met with determined opposition from various societies, and the inquiry was attended by a large number of persons from London, Birmingham, and other places.

Oil Seeds Export from Colonies

Restricted to the Empire

The Colonial Office has made it known that the Governments of Nigeria, the Gold Coast, Sierra Leone and the Gambia have been requested at the instance of the Food Controller, to prohibit the exportation from those colonies during the next few months to all destinations outside the British Empire of palm kernels, ground nuts, and copra, but to issue export licences to all exporters of those articles to the United Kingdom who apply for them on the following basis :—(*a*) The licence to be transferable to the holder if desired and to authorise the exportation to any country outside the British Empire to which goods may lawfully be exported of a fixed proportion of the amount of the article which that exporter has shipped to the United Kingdom. (*b*) The proportions to be :—Palm kernels, a licence for 10 tons for every 90 tons shipped to the United Kingdom; ground nuts, a licence for 20 tons for every 100 tons shipped to the United Kingdom; copra, a licence for 100 tons for every 100 tons shipped to the United Kingdom. It has been left to the discretion of the Colonial Governments whether they should adopt the above arrangements as regards ground nuts pending receipt of information as to whether the Indian Government intend to impose restrictions on the exportation to destinations outside the Empire of Indian ground nuts. When the above-mentioned export prohibitions have been imposed, other oil-seeds and oleaginous nuts, seeds, and products (with the possible exception of palm kernel oil) will be freed from export prohibitions in the British West African Colonies and Protectorates. Under these arrangements the granting of export licences to exporters will be entirely a matter for the Colonial Government, to whom all applications should be addressed.

The Niger Co., Ltd.

Prospects of the Company

Mr. Clifford Edgar, M.P. (vice-chairman), presiding at the thirty-ninth ordinary general meeting of the Niger Co., Ltd., held in London on Friday, October 24, said that the stringent Government control under which the edible fat industry was carried on throughout the year 1918 made it impossible for factories to concentrate on the most profitable business, and the De Bruyn Co. experienced a full share of the disadvantage of this. During the current year, however, that company had recovered possession of its most important factories in the late war zone, which was now working with very promising results.

With regard to the trade in hides and skins, this promised important developments, and in view of these prospects the company had acquired all the Nigerian rights of the Pyrotan Leather Co., together with a half-share of their interests in the other parts of West Africa. The process was one for the quick tanning of hides and skins, and a consignment of Niger skins had been treated in England with very satisfactory results. It was proposed to erect the first tannery in Nigeria in the course of a few months.

Referring to the mining industry, Mr. Edgar said that the high price of tin had stimulated prospecting, with the result that new valuable deposits had been found, and there seemed no reason to doubt that the Nigerian output would continue to increase.

Obituary

Sir W. L. Greenwell.—Sir Walter Lloyd Greenwell, Bart., who has died, from pneumonia, at his residence, Marden Park, Woldingham, Surrey, in addition to being a director of the Amelia Nitrate Co., was a well-known stockbroker. He was High Sheriff of Surrey in 1903, and one of His Majesty's Lieutenants of the City of London. He was also a J.P. for Surrey.

Mr. J. J. Stead.—The death took place on Thursday, October 23, after three months' illness, of Mr. J. J. Stead, of Albert Cottage, Union Street, Heckmondwike. Mr. Stead, who retired from business as a drysalter about twenty-five years ago, was well known throughout Yorkshire as an antiquary and amateur photographer. Among the organisations in whose work he took a prominent part were the Brontë Society, of which he was one of the founders, the Yorkshire Archæological Society, and the Yorkshire Dialect Society. Mr. Stead served one term on the Heckmondwike School Board, and for twenty-seven years was a director of the Heckmondwike and Liversedge Gas Co., from the chairmanship of which he recently retired, after occupying the position for fifteen years.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, October 30.

BUSINESS continues very brisk generally, although perhaps there may be a slackening off in the home trade demand, due probably to those buyers who became short during the strike having replenished their supplies. Values show little change.

Export business continues very satisfactory, and we are of opinion that trade in this direction should still further improve. Owing to labour difficulties and other causes, American sellers are now out of the market for some products, and this is causing a larger influx of enquiries and orders to this country.

General Chemicals

ACID ACETIC.—A satisfactory trade is being done, and the price holds firm.

ACID CARBOLIC.—There is not quite so much demand for this material, but the price is firm and the makers are well sold.

ACID OXALIC is steadier than has been the case recently, and is moving off well. English makers' price is maintained.

ALUM is in request, and it is not easy to purchase for near delivery.

AMMONIUM SALTS continue in active demand, and in some cases higher prices are asked for forward delivery.

ARSENIC is the turn easier, but supplies are not by any means plentiful.

BARIUM SALTS are on the quiet side. A fair business has been done in chloride for export.

BLEACHING POWDER is quiet, but price steady at recent rates.

COPPER SULPHATE is still stagnant, and there is no movement to report.

FORMALDEHYDE continues very scarce, and a further advance in price is noted.

IRON SULPHATE (Green Copperas) is selling freely, but spot delivery can quite easily be obtained.

LEAD ACETATE is firm and is moving off steadily.

LEAD NITRATE.—There is slightly more business passing in this product, and price is a shade higher.

LITHARGE is extremely active at the advanced figure, and some heavy contracts have been placed for forward.

LITHOPONE continues in active request, and available supplies are readily absorbed.

METHYL ACETONE is scarce.

POTASSIUM BICHROMATE.—A steady business is reported, especially for export.

POTASSIUM CARBONATE is steady on the spot at recent rates, but lower quotations are made for supplies near at hand.

POTASSIUM CHLORATE.—Only a moderate business is being done in this product at recent rate.

POTASSIUM NITRATE is unchanged in value, and sellers are well sold.

POTASSIUM PERMANGANATE is again slightly lower in price, and supplies seem to be more plentiful.

POTASSIUM PRUSSIATE is much firmer and demand better. It is understood that import licences are only being granted sparingly, if at all.

SODIUM ACETATE is steady, and trade is slightly better.

SODIUM BICARBONATE.—A fairly heavy business has been transacted for export.

SODIUM CAUSTIC.—Trade continues extremely active in this product for export, and price is very firm. If the threatened coal stoppage in the United States takes place, it is probable that we shall see a further large influx of orders for this material to this country.

SODIUM HYPOSULPHITE is scarce, and is in request for export.

SODIUM NITRITE is slightly firmer and scarce on the spot.

SODIUM PRUSSIATE is practically unobtainable for spot delivery, and price is again higher.

SODIUM SULPHIDE is only in moderate request.

ZINC SALTS are in more active request, and prices are firm.

Coal Tar Intermediates

This market has been decidedly interesting, and some heavy orders have been placed for forward delivery. Manufacturers are now very full with orders, and prices in several directions show a distinct tendency to advance. Export trade in this section is also encouraging.

ANILINE SALT is still badly wanted for export, but is practically unobtainable on the spot. The price is very firm.

ALPHA NAPHTHOL.—Business is reported in this product, and the price is higher.

ALPHA NAPHTHYLAMINE.—Makers are well encouraged with orders, and material is inclined to be scarce for near delivery.

BETA NAPHTHOL is also higher in price, and supplies difficult to obtain.

DIMETHYLANILINE is in active demand, and some large orders have been placed. The price is expected to be higher in the near future.

PARANITRANILINE is wanted, but the price is extremely firm.

PARAPHENYLENEDIAMINE is in better request, but can be obtained for prompt delivery at last quoted prices.

Heavy Coal Tar Products

The market for coal tar products remains firm; supplies of most articles are scarce and deliveries difficult to obtain.

BENZOL (90 per cent.) has been quoted at 2s. f.o.r. for prompt and 2s. 2d. has been indicated for forward business. The quantities in both cases are limited.

CRESYLIC ACID.—The 97/99 per cent. quality is showing an upward tendency in price, and 2s. 6d. per gallon naked at works is indicated. For the 95/97 per cent. quality, the price remains from 2s. 3d. to 2s. 4d. per gallon.

CREOSOTE OIL remains active, at a price of about 6d. to 6½d. per gallon in the North, and 7d. to 7¾d. per gallon in the South.

NAPHTHALENE is in fair demand, and only small quantities are available. The prices are about £7 10s. for the crude and £20 for the refined.

SOLVENT NAPHTHA remains firm, and there is very little for disposal. The price for prompt business is 2s. 6d. f.o.r. makers' works in the Midlands and 2s. 8d. in London. 1920 business has been done at 2s. 6d. f.o.r. makers' works.

HEAVY NAPHTHA is showing increased activity at a price of about 2s. 5d. in the Midlands and 2s. 7d. in London.

PITCH.—Business has been reported at 80s. to 85s. f.o.b. London, 75s. f.o.b. East Coast, and 67s. 6d. to 70s. f.o.b. West Coast.

Sulphate of Ammonia

Owing to the demand for home consumption, the Board of Agriculture have intimated that licences for export during the period November/December will only be granted for a very limited quantity, and therefore few contracts are being made.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, glacial, 99-100%	ton	77	10	0	to	80	0	0
Acetic, 80% pure	ton	65	0	0	to	67	10	0
Carbolic, cryst. 39-40°	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	4	to	0	4	5
Lactic, 50 vol.	ton	70	0	0	to	72	10	0
Lactic, 60 vol.	ton	85	0	0	to	87	10	0
Oxalic	lb.	0	1	1	to	0	1	1½
Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Tannic, commercial	lb.	0	3	0	to	0	3	3
Tartaric	lb.	0	3	3	to	0	3	4
Alum, lump	ton	17	15	0	to	18	0	0
Aluminium, sulphate, 14-15%	ton	14	10	0	to	15	0	0
Aluminium, sulphate, 17-18%	ton	18	0	0	to	18	10	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	6½	to		—	
Ammonia, muriate (galvanisers)	ton	44	0	0	to	45	0	0
Ammonia, nitrate	ton	50	0	0	to	55	0	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Arsenic, white, powdered	ton	58	0	0	to	60	0	0
Barium, carbonate, 92-94%	ton	13	0	0	to	14	0	0
Chloride	ton	22	0	0	to	23	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	16	10	0	to	17	0	0
Borax crystals	ton	39	0	0	to	40	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Chloride	ton	8	10	0	to	9	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper sulphate	ton	40	0	0	to	41	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde 40% vol.	ton	150	0	0	to	155	0	0
Iron perchloride	ton	32	0	0	to	34	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	83	0	0	to	85	0	0
Carbonate (White Lead)	ton	51	0	0	to	55	0	0
Nitrate	ton	58	0	0	to	59	0	0
Lithophone, 30%	ton	44	0	0	to	46	0	0
Magnesium chloride	ton	15	0	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	11	0	0	to	11	10	0
Sulphate (Druggists')	ton	17	10	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	102	0	0	to	105	0	0
Potassium Chlorate	lb.	0	1	2	to	0	1	3
Meta-bisulphite, 50-52%	ton	224	0	0	to	240	0	0
Nitrate, refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	3	0	to	0	3	3
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	1	10	to	0	2	0
Sulphate 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	0	0	to		—	
Seconds	cwt.	3	15	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	9	0	0	to	9	10	0
Bisulphite, 60-62%	ton	32	0	0	to	33	0	0
Chlorate	lb.	0	0	6	to	0	0	6½
Caustic, 70%	ton	24	10	0	to	25	10	0
Caustic, 76%	ton	25	0	0	to	26	0	0
Hyposulphite, commercial	ton	19	0	0	to	19	10	0
Nitrite, 96-98%	ton	60	0	0	to	61	0	0
Phosphate, crystal	ton	28	0	0	to	30	0	0
Prussiate	lb.	0	0	11½	to	0	1	0
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	22	10	0	to	23	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	85	0	0	to	90	0	0
,, Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	38	0	0	to	40	0	0
Tin perchloride, 33%	lb.	0	2	4	to	0	2	5
,, Protochloride (tin crystals)	lb.	0	1	9	to	0	1	10
Zinc chloride 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Sulphate,	ton	21	10	0	to	23	0	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	6	to	0	2	9
Aniline oil, drums free	lb.	0	1	2	to	0	1	3
Aniline salts	lb.	0	1	8	to	0	1	9
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	6	to	0	7	0
Benzidine, base	lb.	0	6	6	to	0	7	0
Benzidine, sulphate	lb.	0	5	6	to	0	6	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	1	9	to	0	2	0
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	6	to	0	2	9
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	8	0
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	1	6	to	0	1	9
Dinitrotoluol	lb.	0	1	10	to	0	2	0
Dinitrophenol	lb.	0	1	3	to	0	1	6
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	11	6	to	0	12	0
Metaphenylenediamine	lb.	0	4	9	to	0	5	0
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	4	0	to	0	4	6
Naphthylamin-di-sulphonic acid	lb.	0	4	6	to	0	5	6
Nitronaphthaline	lb.	0	1	2	to	0	1	3
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor.	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	3	8	to	0	3	10
Paranitrophenol	lb.	0	1	10	to	0	2	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	13	0	to	0	14	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	9	0	to	0	10	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	9	to	0	3	0
Salol	lb.	0	4	9	to	0	5	0
Shaeffer Acid, 100% basis	lb	0	3	6	to	0	3	9
Sulphanilic acid, crude	lb.	0	1	3	to	0	1	6
Tolidine, base	lb.	0	9	0	to	0	10	0
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Alsatian Potash Imports

IMPORTS for the week ending October 25, 575 tons Sylvinite 14 per cent. (French kainit), 389 tons Sylvinite 20 per cent. The prices are :—Sylvinite 14 per cent. (French kainit), £7 per ton; Sylvinite 20 per cent. (French potash salts), £8 7s. 6d.; Muriate of Potash, 80 per cent., £19 7s. 6d.

Excise Duty on Power Alcohol

IN virtue of a Belgian Royal Decree of June 15, 1913, total exemption from excise duty was accorded in respect of alcohol destined for the manufacture of acetic or sulphuric ether, artificial silk, pure resin (for sale), and of alcohol employed to produce motive power; and partial exemption was accorded in respect of alcohol used for certain other specified industrial purposes. The excise duty then existing was 200 francs per hectolitre of alcohol of 50° Gay-Lussac at 15° C.; and the partial exemptions referred to were at the rates of 164, 110, and 190 francs per hectolitre, according to the use to which the alcohol was put. The excise duty having now been raised to 800 francs per hectolitre, the Decree of June 15, 1913, has been superseded by a Decree of September 4, 1919, which, however, only differs from the earlier Decree in that the partial exemptions are now at the rates of 764, 770, and 790 francs per hectolitre respectively.

Company News

ANGLO-CHILIAN NITRATE AND RAILWAY.—The directors state that for the first six months of this year there was an almost complete cessation of business in the nitrate industry, and therefore it has been decided not to declare an interim dividend on either the Preference or the Ordinary shares. The directors, however, anticipate at the end of the financial year that they will be able to recommend the payment of a dividend on both classes of shares.

ASSOCIATED PORTLAND CEMENT.—At an extraordinary general meeting of the Associated Portland Cement Manufacturers (1900), Ltd., the shareholders decided that all £10 shares in the company should be divided into ten £1 shares and numbered accordingly, also the name of the company be changed to the Associated Portland Cement Manufacturers, Ltd.

BATAVIA OILFIELDS.—A circular has been issued by the Batavia Oilfields, Ltd., announcing that arrangements have been made for the immediate resumption of operations upon their oilfields at Ranim Island, in the Gulf of Suez. Mr. Henry will take charge of the operations.

CANADA CEMENT COMPANY.—Dividend of 1½ per cent. on the Ordinary Stock for the three months ended September 30.

CHARLES KINLOCH & CO.—Under the scheme of arrangement and reduction of capital, the Preference share register will be closed from to-day (Saturday), for the purpose of preparing for the payment to the Preference shareholders of £2 per five shares, the interest warrants on such payments to November 30, and the certificates for three Ordinary shares per five shares to the stockholders registered on the books on October 31.

DISTILLERY CO.—The Distillery Co., Ltd., has acquired the distillery business of Andrew Usher & Co., Edinburgh, with the balance of their stock and the obligation to provide customers with the supplies to which they are entitled under the Government orders.

EAGLE CREEK OIL.—At the ordinary general meeting of the Eagle Creek Oil Co. (California), Ltd., held in London, on Friday, October 24, Mr. H. Weber (chairman of the company), announced the purchase of valuable property situated in the Gulf of Suez, upon the island of Ranim. Mr. J. D. Henry, by the courtesy of General Oilfields, Ltd., is taking charge of the operations.

EVANS SONS, LESCHER & WEBB, LTD.—The issue of Ordinary shares has been substantially over-subscribed, and the list has been closed.

JOHN LYSAGHT.—The following notice appears in the "Stock Exchange Weekly Official Intelligence," in regard to John Lysaght new Ordinary shares: "Some misunderstanding having occurred as to whether the recent new issue of bonus shares is entitled to rank for the dividend declared at the general meeting, held on September 30, it may be pointed out that such dividend was payable out of the profits of the year ended December 31, 1918; and that the new shares were not created until September 30, 1919."

MEXICAN PETROLEUM.—The consolidated profit and loss account of the Mexican Petroleum Co., of Delaware, and owned companies for the year to December 31 last, shows a net profit of $6,699,445. After deducting dividends and $15,000,000 appropriated and invested in properties and working capital, there remains a carry forward of $1,466,894.

MIAMI COPPER.—Dividend of 50 cents per share, less tax, on capital stock for quarter, payable November 15. Last year, 1 dol. per share.

NOVA SCOTIA STEEL AND COAL COMPANY.—Dividend on the Ordinary Stock of 1½ per cent. for the quarter ended September 30.

RENONG TIN DREDGING.—At the sixth annual general meeting, held in London last week, Mr. A. F. Nicol presiding, a final dividend on the Ordinary shares of the company at the rate of 15 per cent., making 25 per cent. for the year, was declared. Mr. Nicol announced that examination work is being carried on in a new area located in the State of Selangor, F.M.S., consisting of 1,200 acres.

UNITED BRITISH OILFIELDS OF TRINIDAD.—At the sixth ordinary general meeting of United British Oilfields of Trinidad, Ltd., held in London, on Thursday, October 23, the chairman (Mr. H. N. Benjamin) outlined the scheme for the reorganisation of the company; and at an extraordinary general meeting held subsequently resolutions were passed increasing the capital of the Company to £1,500,000 by the creation of 850,000 new shares of £1 each, and approving new articles of association.

YOUNG'S PARAFFIN LIGHT AND MINERAL OIL.—27 per cent. of the "B" debenture holders have not accepted the offer for the abandonment of their contingent rights, and the Anglo-Persian Oil Co. have withdrawn their offer, but will reconsider the matter in the event of the minority seeing their way to agree within a reasonable time.

SHIP CANAL PORTLAND CEMENT MANUFACTURERS.—The report for the year to March 31 last states that after charging repairs and renewals to the working account the directors have written off £10,000 to depreciation, leaving a credit balance of £14,781, and £6,449 was brought in, making £21,230, which the directors proposed to carry forward. To facilitate the company's financial arrangements the directors entered into an agreement with the British Maritime Trust, Ltd., and to give effect to the conditions of that agreement, the capital of the company was increased by the creation of a further 150,000 Ordinary shares of £1 each and 1,500 Deferred shares of 1s. each. None of these shares have been issued.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Oct. 22.	Oct. 29.
Alby United Carbide Factories, Lim., Ord.	27/32–31/32	27/32–31/32
Associated Portland Cement Manufrs. (1900.) Lim., Ord.	11⅜–11⅞	23/0–24/0
Bell's United Asbestos Co., Lim., Ord.	2 5/16–2 9/16xd	2 3/8–2 5/8xd
Bleachers' Association, Lim., Ord.	1 5/8–1 3/4	1 11/16–1 13/16
Borax Consolidated, Lim., Prefd. Ord.	4½–5	4½–5
Bradford Dyers' Assoc., Lim., Ord.	2¼–2⅜	2 5/16–2 7/16
British Aluminium Co., Lim., Ord.	1¾–1⅞	1¾–1⅞
British Oil and Cake Mills, Lim., Ord.	2 7/16–2 9/16	2 7/16–2 9/16
British Portland Cement Manufrs., Lim., Ord.	1⅝–1¾	30/0–32/0
Brunner, Mond & Co., Lim., Ord.	2⅝–2⅞	2 1/16–2 3/16
Castner-Kellner Alkali Co., Lim.	2⅛–2⅜	2⅛–2⅜
China Clay Corporation, Lim., Ord.	¼–⅜	¼–⅜
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.	57–61	57–61
Courtaulds, Lim.	11–12	11–12
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.	1 1/16–1 1/16	1 1/16–1 1/16
Curtis's & Harvey, Lim.	2 1/16–2 1/8	2 1/16–2 1/8
Electro Bleach and By-Products, Ltd., 7% Pref.	.. ..	.. ..
Explosives Trades, Lim., Ord.	20/6–21/6	22/0–23/0
Field (J. C & J.), Lim., Ord.	1¼–1⅜	1⅛–1⅜
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	11/16–13/16	11/16–13/16
Harrisons & Crosfield, Lim., 10% Cum. Prefd. Ord.	1⅜–1½	1⅜–1½
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	17–18	17–18
Lawes' Chemical Manure Co., Lim., Ord.	5¼–5¾	5¼–5¾
Lever Bros., Lim., 6 % Cum. "A" Pref.	20/1½20/10½	20/1½20/10½
Do. 6½ % Cum. "B" Pref.	20/0–20/9	20/0–20/9
Magadi Soda Co., Lim., Ord.	13/16–15/16	13/16–15/16
Manganese Bronze and Brass Co., Lim., Ord.	11/16–13/16	11/16–13/16
Maypole Dairy Co., Lim., Defd. Ord.	31/32–1	15/16–1
Mond Nickel Co., Lim., 7% Cum. Pref.	1 1/16–1 3/16	1 1/16–1 3/16
Do. 7% Non. Cum. Pref.	1 1/16–1 1/16	1 1/16–1 1/16
Pacific Phosphate Co., Lim., Ord.	4⅛–5⅛	4⅛–5⅛
Power-Gas Corporation, Lim., Ord.	7/8–1	11/16–12/16
Price's Patent Candle Co., Lim.	90–95	91–96
Salt Union, Lim., Ord.	1½–1⅝	1 9/16–1 11/16
United Alkali Co., Lim., Ord.	1¼–1½	1¼–1⅜
Val de Travers Asphalte Paving Co., Lim.	1–1⅛	15/16–1 1/16
Van den Berghs, Lim., Ord.	3⅜–3⅝	3 7/16–3 11/16
Walkers, Parker & Co., Lim.	1 5/16–1 7/16	1 5/8–1 7/16
Welsbach Light Co., Lim.	2 5/16–2 7/16	2⅛–2⅜

Gas, Iron, Coal and Steel

Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	38/6–39/6	1 37/32–1 39/32
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	25/6–26/6	25/3–26/3
Gas Light and Coke Co., Ordinary Stock (4% Stand.)	58–61	58–61
Hadfield's, Limited, Ordinary	39/0–41/0	38/0–40/0
South Metropolitan Gas Co., Ordinary (4% Stand.)	58–61	58–61
Staveley Coal & Iron Co., Lim., Ord.	1⅞–1⅞xd	1⅞–1⅞xd
Vickers, Limited, Ordinary	34/6–35/6	34/0–35/0

Mines, Nitrate, &c.

Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	15½–16	15½–16
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.	88–93	88–93
Lagunas Nitrate Co., Lim.	1½–1⅝	1½–1⅝
Rio Tinto Co., Lim., Ord. (Bearer)	51–53	51–53
Tarapacá and Tocopilla Nitrate Co., Lim.	17/0–18/0	16/6–17/6

Oil and Rubber

Anglo-Java Rubber & Produce Co., Lim.	7/7½–8/1⅛	8/3–8/9
Anglo-Maikop Corporation, Ltd., Ord.	8/3–9/3	9/6–10/6
Anglo-Malay Rubber Co., Lim.	14/3–14/9	14/6–15/0xd
Anglo-Persian Oil Co., Lim., Cum. 6 % Part.	1 9/32–1 11/32	1 9/32–1 11/32
Burmah Oil Co. Ltd., Ord.	14⅝–15	18–18½
Chersonese (F.M.S.) Estates, Lim.	4/3–4/6	4/4½–4/7½
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	10 29/32–10 15/16	11 1/16–11 3/32
"Shell" Transport and Trading Co., Lim., Ord.	9⅝–9⅞	9 13/16–10 3/16
Do. 5% Cum. Pref.	9 5/16–9 9/16xd	9 5/16–9 9/16xd

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE.

Partnership Dissolved

JONES, William, and EVANS, Nathaniel John, pharmaceutical chemists and druggists, 134, Southampton Row, Bloomsbury, under the style of WILLIAM JONES & CO., by mutual consent as and from October 20. All debts received and paid by Nathaniel John Evans, who will continue the business under the same name.

Bankruptcy Information

BLACKWELL, Richard G., 5, Hornby Road, Old Trafford, Manchester, representative of a chemical company. First meeting, November 5, 2.30 p.m. Official Receiver's Offices, Byrom Street, Manchester. Public examination, November 18, 10.30 a.m., Court House, Encombe Place, Salford.

Liquidators' Notices

THE WEAR PORTLAND CEMENT CO., LTD. (in Voluntary Liquidation).—A meeting of creditors will be held at 26, John Street, Sunderland, on Monday, November 3, at 11 a.m. H. S. Squance, Liquidator.

RUBEL BRONZE & METAL CO., LTD.—Creditors' claims on or before December 10 to Harry S. Foster, Liquidator, 82, Victoria Street, S.W.

Notice of Dividend

TAYLOR, Henry Finney, Glebe House, Carsington, Derbyshire, and trading at the Hopton Bone Works, Wirksworth, Derbyshire, bone manure manufacturer. 15s. (making with previous dividend 20s. in the £). Supplemental. October 31, Official Receiver's Offices, 4, Castle Place, Park Street, Nottingham.

Notice of Intended Dividend

LONG, John, 85, Otley Road, Guiseley, Yorks., lately residing at Hawksworth Road, Horsforth, Yorks., dyer and finisher. November 8. Trustee H. C. Bowling, Official Receiver, 24, Bond Street, Leeds.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of* 1908 *provides that every Mortgage or Charge, as described therein, created after July* 1*st*, 1908, *shall be registered within* 21 *days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July* 1, 1908, *require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

PORCO TIN MINES, LTD., LONDON, E.C.—Registered July 31, £30,000 debentures part of £74,000, increased from £19,900; general charge. *£19,900. October 17, 1918.

SLAG AND TAR MACADAM CO., LTD., DARLINGTON.—Registered October 14, debentures for securing all moneys due or to become due, but not exceeding £3,000, to the Bank of Liverpool and Martin's, Ltd.; specific charge of leaseholds and goodwill, and a floating general charge. *£4,000. December 31, 1918.

Satisfaction

VICKERS, LTD. (formerly VICKERS SONS & MAXIM, LTD.), LONDON, S.W.—Satisfaction registered October 17, £1,000,000 third debentures, registered February 18, 1908.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 110 and 117, Chancery Lane, London W.C.:—

VOXAL PRODUCTS CO. (1919), LTD., 8, North John Street, Liverpool.—Tallow, grease and oil refiner and fertiliser manufacturer. Nominal capital, £50,000 in 50,000 shares of £1 each. Directors: O. Toole, 43, Penkett Road, Wallasey, Cheshire; G. J. Jones, Silverdale, Neston, Cheshire. Qualification of Directors, 100 Ordinary shares.

MICA MANUFACTURING CO., LTD., 22½, Cazinove Road, N. 16.—Manufacturers and dealers in chemical and other machinery, &c., used in the business of electrical or other engineers. Nominal capital, £52,000 in 25,000 shares of £1 each. Directors: P. Freeman, 19, Combetron Road, Upper Clapton, E. 6 (Managing Director); T. J. Sack, 90, Queen's Road, Wimbledon, S.W.; G. H. Hadder, 146, Gladismore Road, Stamford Hill, N. 13. Qualification of Directors, £500. Remuneration of Directors, £20 each. £400 Managing Director.

CALLARD, LTD.—Oil refiners and electro-platers. Nominal capital, £5,000 in 1,000 Preference shares of £1 and 4,000 Ordinary shares of £1. Directors: To be appointed by subscribers. Qualification of Directors, £10. Remuneration of Directors, £50; Chairman, £75. Subscribers: R. G. Davis, Aldermans House, Bishopsgate, E.C.; A. Roe, Aldermans House, Bishopsgate, E.C.

SCIENTIFIC COLOUR CO., LTD.—Potters' colours and materials of all kinds. Nominal capital, £10,000 in 4,000 Preference shares and 6,000 Ordinary shares of £1. Directors: K. B. Benham, Deans Hill, Stafford; R. E. Meade, The Hollies, Stafford. Qualification of Directors, £100.

CATTLE CAKE CO., LTD.—Manufacturers of cakes, meals and foods. Nominal capital, £25,000 in 500,000 shares of 1s. Directors: H. Overman, V. Musgrave, F. B. Lacey, C. F. Mundy, Permanent Directors. Qualification of Directors: Permanent Directors 10,000 Ordinary shares. Remuneration of Directors: 10 per cent. net profits. Subscribers: E. H. Barchard, 22, College Hill, E.C.; P.M. Sanderson, 22, College Hill, E.C.

ELECTRO-METALLURGICAL EXTRACTION, LTD.—To manufacture and deal in chemical elements, compounds, products, by-products and residuals. Nominal capital £30,000 in 30,000 shares of £1 each. Minimum subscription, 7 shares. Directors: To be appointed by subscribers. Qualification of Directors, £250. Remuneration of Directors, £50 each; Chairman, £100. Subscribers: C. C. Tarellt, 62, London Wall, E.C.; W. R. Smith, 6, Lawley Street, Clapton, E. 5; E. J. Burrows, 29, Lyndhurst Road, Highams Park, Chingford, E.

CHEMICAL AND COMMERCIAL TRUST, LTD., 41, Finsbury Square, E.C.—Manufacturing and analytical chemists. Nominal capital, £25,000 in 20,000 Ordinary shares of £1 each and 100,000 Deferred shares of 1s. each. Directors: To be appointed by Subscribers. Qualification of Directors: 1 share.

FEDERATED TEXTILES, LTD., 77–79, Cannon Street, E.C. India rubber manufacturers and manufacturers of gutta-percha and substitutes thereof. Nominal capital, £250,000 in 250,000 shares of £1 each. Directors: A. Spencer, 13, Devonshire Street, W.; F. Turner, Beightons, Rochdale; F. Spencer, The Abbey, Aston Abbots, Bucks.; H. B. Potter, Lee House, Rochdale. Qualification of Directors, 500 Ordinary shares. Remuneration of Directors: £1,000 to be divided.

NEW BRITISH INTERNATIONAL OIL SYNDICATE, LTD., 3, London Wall Buildings, E.C.—To purchase and take on lease, rent and otherwise acquire oil-fields, wells, and shale-fields, and turn same to account. Nominal capital: £26,250 in 25,000 Ordinary shares of £1, 25,000 Founders' shares of 1s. Directors: P. Marsden, 45, Hanover Gate Mansions, Regent's Park, N.W.; R. Taylor, 10, Gracechurch Street, E.C. 3; W. B. Marsden, 2, Hidderpore Avenue, N.W. 3. Qualification of Directors: 100 Ordinary shares. Remuneration of Directors: To be voted by company in general meeting.

NIGGERINO, LTD.—Chemical and colour manufacturers. Nominal capital: £3,000 in 3,000 shares of £1 each. Directors: J. Morris, A. F. Hewitt, B. J. Pearce, F. W. Porter. Qualification of Directors: 100 shares. Remuneration of Directors: To be voted by company in general meeting. Subscribers: E. H. Banks, 26, North John Street, Liverpool; E. Maguire, 26, Earlsfield Road, Liverpool.

FOUR ASHES MANUFACTURING CO., LTD.—Manufacturing chemists and distillers of tar and all tar products. Nominal capital: £100,000 in 100,000 shares of £1 each. Directors: To be appointed by Subscribers. Qualification of Directors: £100. Remuneration of Directors: £50 each; Chairman £100. Subscribers: W. S. Mason, 26, Glyn Road, Clapton, N.E.; Lilian Robinson, 73, Hillfield Avenue, Hornsey, N. 8.

TRINIDAD WESTERN OILFIELDS, LTD., 448, Strand, W.C. 2.—To acquire oil-fields, metals, minerals, and lands in the island of Trinidad and turn same to account. Nominal capital £150,000 in 600,000 shares of 5s. each. Minimum subscription: 7 shares. Directors: H. G. Simpson, 12, Pembridge Square, W.; D. L. Matthew, 137, Westbourne Terrace, Hyde Park, W.; H. Simpson, 5, Pembridge Gardens, W. Qualification of Directors: £250.

CENTRIFUGAL SEPARATORS, LTD.—To acquire and carry on the business of the Hydraulic Separating and Grading Co., Ltd. Nominal capital: £275,000 in 175,000 "A" shares of £1, and 100,000 "B" shares of £1. Minimum subscriptions: 7 shares. Directors: Sir A. T. Dawson, Knight, 2, Green Street, Park Lane, W. 1; Sir J. McKechnie, K.B.E., The Ashbey House, Farmers Abbey, Lancashire; W. J. Gee, 48, Kingsmead Road, Tulse Hill, S.W.; A. B. Gill, The Willows, Wargrave, Berks; H. S. Loebe, Marians, Elstreet, Herts. Qualification of Directors: 500 shares. Remuneration of Directors: £300 each.; Chairman £400.

ANGLO-UNITED OILFIELDS, LTD., 8, Princes Street, E.C. 2.—To acquire certain oil-bearing property in the State of Wyoming with a view to development and working such oil-bearing property.

Nominal capital: £225,000 in 225,000 shares of £1 each. Minimum subscription: 160,000 shares. Directors: Sir T. R. Wynn, K.C.S.P., K.C.I.E., 66, The Albany, Piccadilly, W.; Rt. Hon. Viscount Bertie of Thame, 22, Bryanston Square, W.; I. Rapaport, 50, Moor Lane, E.C. 2. Qualification of Directors: £250. Remuneration of Directors: £250; Chairman, £350.

SUN FUEL CO., LTD., Salisbury House, London Wall, E.C.—Manufacturers and dealers in patent fuels and fuels of every description Nominal capital: £250,000 in 250,000 shares of £1 each. Minimum subscription 25 shares. Directors: I. Etherington, Longland Bay House, Swansea; J. Groom, Daynes Dyke, Llamadoo, Glam.; A. W. Raschke, Boscombe Lodge, Woking; A. T. M. Jones, Fern Bank, Glenferrie Road, St. Albans; J. A. Lickie, Kippen, Streetley, Warwick; R. D. M. Delfrich, 2, Connaught Square, Hyde Park, W. 2. Qualification of Directors, other than first Directors: £200. Remuneration of Directors: £200 each; Chairman, £300; Deputy Chairman, £230.

PARRY PURE DRUG CO., LTD., 10, Adam Street, Adelphi, Strand, W.C.—Nominal capital £5,000 in 5,000 shares of £1 each. Director: G. Parry, 1, High Street, Bloomsbury, W.C. Qualification of Directors, £1.

CLAN, LTD., 43, Plynlimmon Road, Hastings, Sussex.—Manufacturing, wholesale and retail chemists and druggists. Nominal Capital £500 in 500 shares of £1 each. Directors: A. MacConchie, 40, Milward Crescent, Hastings. Managing Director; Constance M. McConchie, 40, Milward Crescent, Hastings. Qualification of Directors, 1 share.

JAMES BROWN, 1919 (BRENTWOOD), LTD.—Patent fuel manufacturers. Nominal capital £10,000 in 9,750 Preference Ordinary Shares of £1 each, and 5,0 0 Deferred Ordinary Shares of 1s. each. Directors: T. M. Jones, The White House, Loughton, Essex; A. J. Mardlin, 64, Shoot-up Hill, N.W. 2; A. E. Brown; E. J. Brown. Remuneration of Directors, £50 each.

JAMES POTTER & CO., LTD., 93, Barmston Street. Hull.—Oil mill outfitters. Nominal capital, £3,000 in 3,000 shares of £1 each. Directors: To be appointed by Subscribers. Qualification of Directors; £50. Remuneration of Directors, £15 per cent. of net profits.

Joint Stock Companies

THE undermentioned companies have been struck off the Register:—

Chemical Conversion Co., Ltd.
Efficiency Oil Corporation of London, Ltd.
Gravesend Portland Cement Co., Ltd.
Nitrogen Recovery Co., Ltd.
Pharmacy and Drug Store Supply Association (Lancashire), Ltd.
Standard Dye Manufacturing Co., Ltd.
Widnes Refineries, Ltd.

Lindley, Duffield & Co.

IN the bankruptcy of Mrs. Sarah Alice Duffield and Wynyard Hamilton Ryde Weller, who carried on business as *Lindley Duffield & Co.*, merchants, lately at 1 and 2, Great Winchester Street, E.C., principally dealing in soap, the joint statement of affairs shows liabilities £8,508 11s. 2d., all expected to rank for dividend; assets consisting of stock-in-trade £50 (cost £800), and bad book debts £200; deficiency £8,458 11s. 2d.

The Official Receiver states that in October, 1918, judgment for £3,500 was given in an action brought against the firm to recover damages in respect of the sale of certain soap which was alleged not to be up to the standard guaranteed. Subsequently the soap market generally became stagnant, and to pay the expenses, wages, &c., the stocks of the firm were sold at a heavy loss. Mrs. Duffield attributes the failure of the firm, to the adverse verdict in the action mentioned, to the expenses of the law suit and the resultant loss of business, to the cancellation of large contracts by the firm bringing the action, and to the absolute stagnation of the soap market due to the prohibition of export and the fears of the result of Government control. (These causes were originally given by the manager, F. L. Duffield, and the debtor says that she entirely agrees with him.)

The debtor Weller was previously adjudged a bankrupt in the High Court on March 27, 1915; his liabilities were then estimated at £697, and no assets were disclosed. He has not applied for his discharge. On July 1, 1917, he entered into partnership with Mrs. Duffield as agents and merchants. He put in no capital and was to receive £3 a week for keeping the books and one half share of the net profits. Finding that he could not give the time to the partnership business, he, on September 1 following, wrote to F. L. Duffield, the manager, tendering his resignation, but he took no other steps to dissolve the partnership. Afterwards he never attended at the firm's offices and in his view he ceased to be a partner as from that date, when there were no debts outstanding. On June 19, on his consent, the Court made an order for him to set aside from his present salary the sum of £4 3s. 4d. a month towards the payment of his debts in the 1915 bankruptcy.

An adjourned sitting for the public examination of the debtors was appointed at the London Bankruptcy Court on Wednesday, before Mr. Registrar Hope. Weller stated that he did not tell either Mr. or Mrs. Duffield, either before or after he entered into the agreement that he was an undischarged bankrupt, and he continued in his employment as a clerk in the Minstry of Food, never having anything to do with the business in reality. The first he knew of the bankruptcy was when he received an order of the Court to attend. He did not know that there were liabilities amounting to some £8,000 or £9,000 contracted, neither did he take any steps to see whether the creditors were being protected. He never saw the cheques which bore his signature because he signed blank cheques which he then handed to Mr. Duffield, who made them out for what amounts he required. In September, 1917, he resigned his position in the partnership, but gave no notice to creditors and never saw that a dissolution was registered.—The Official Receiver: But notwithstanding the fact that you had resigned, you continued to sign cheques up to a very late date?—The debtor explained that those must be some of the cheques which he signed in blank. He had never received any money out of the business and if three cheques of £10 each were shown as having been drawn in his favour he had never received the proceeds. His recollection of the transactions was that he handed Duffield cash as against those cheques. His position generally was that he knew nothing about the business.

Weller's examination was ordered to be concluded and that of Mrs. Duffield adjourned, on the strength of a medical certificate, until December 17.

Permanganate of Potash Contract.

IN the Commercial Court of the King's Bench Division on Wednesday, before Mr. Justice Roche, Messrs. Roth, Schmidt & Co., of Great St. Helens, London, claimed from Messrs. W. Nagase & Co., Ltd., of Fen Court, London, £2,086 8s. 2d., being the amount which they said was payable to them under an award dated April, 1919.

Matters in dispute between the parties in relation to a contract dated September 27, 1918, for the sale of about 10,000 lbs. of permanganate of potash were referred to arbitration, and the arbitrators, after hearing the parties, awarded that the permanganate of potash delivered by the defendants to the plaintiffs was not in accordance with the contract, and that the defendants should repay the sum they received from the plaintiffs, with interest at the rate of 5 per cent per annum.

The defendants denied that the award was a final award, and they also said the alleged award was bad for excess of jurisdiction. The contract was subject to the rules of the General Produce Brokers' Association of London, but the award was not in accordance with such rules, and the arbitrators had no jurisdiction to award repayment of the purchase price.

Mr. Justice Roche, after hearing witnesses and counsel on both sides, found in favour of the plaintiffs, and gave judgment for them for £2,055 16s. 8d.

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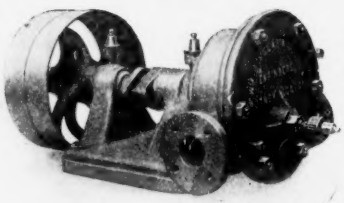
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